

Opasraportti

LuTK - Biology 2016-2017 (2016 - 2017)

Tutkintorakenteet

B.Sc. Degree in Biology (ecology)

Tutkintorakenteen tila: published

Lukuvuosi: 2016-17

Lukuvuoden alkamispäivämäärä: 01.08.2016

Major Studies in Biology (vähintään 85 op)

In the biology degree programme the line of study and the major subject in the Bachelor of Science degree is biology.

Basic Studies in Biology

750124P: Basics of ecology, 5 op

750121P: Cell biology, 5 op

757109P: Concepts of genetics, 5 op

757110P: Experimental course in general genetics, 5 op

Intermediate Studies in Biology

755323A: Animal physiology, 5 op

750366A: Bachelor of Science final examination, 5 op

750332A: Bachelor of Science maturity exam, 0 op

750376A: Bachelor of Science seminar and thesis, 10 op

750373A: Biogeography, 5 op

755320A: Developmental biology-histology, lectures, 5 op

750372A: Evolution and systematics of organisms, 5 op

750336A: Evolutionary ecology, 5 op

755333A: Identification of animals, 6 op

Compulsory

755333A-01: Basic identification of animals, vertebrate, 0 op

755333A-02: Basic identification of animals, invertebrate, 0 op

756342A: Identification of plant species, 3 - 4 op

757312A: Molecular evolution, 5 op

756346A: Plant biology lectures, 5 op

756353A: Plant developmental biology, 5 op

Optional Studies in Biology

Ecology, minor studies (vähintään 40 op)

Student will choose major subject biology and other minor subject in biology (bioscience or ecology) to their B.Sc. degree. The selection of minor subject will already direct the student towards the line of study and the major subject of the M.Sc. studies (ecology).

Compulsory

756351A: Basics in population ecology, 5 op
 750374A: Evolution, systematics and morphology of organisms, 3 op
 755321A: Field course in aquatic animals, 5 op
 756343A: Field course in ecological botany, 5 op
 755322A: Field course in terrestrial animals, 5 op
 755325A: Methods in ecology I, 5 op
 755329A: Methods in ecology II, 5 op
 756344A: Plant ecology, 5 op

Optional

751366A: Animal behaviour, 5 op
 756348A: Ecological responses to global change and air pollution in the subarctic, 5 - 8 op
 750349A: Examinations on optional topics in biology, 2 - 10 op
 755313A: Field identification of birds, 1 - 5 op
 755324A: Functional animal ecology, 5 op
 754322A: Introduction to hydrobiology, 5 op
 756304A: Plant ecophysiology in changing environments, 5 op
 750313A: Research training, 2 - 15 op
 755328A: Wildlife management and game animal ecology, 5 op
 750377A: Winter ecology and physiology, 5 op
 750380A: Working knowledge, 1 - 5 op

Other compulsory minor subject (vähintään 25 op)

Choose 25 ECTS minor subject studies.

General studies, Language and Communication Studies (vähintään 7 op)

Compulsory

902002Y: English 1 (Reading for Academic Purposes), 2 op
 902004Y: English 2 (Scientific Communication), 2 op
 750031Y: Orientation course for new students, 1 op
 901035Y: Second Official Language (Swedish), Oral Skills, 1 op
 901034Y: Second Official Language (Swedish), Written Skills, 1 op

Optional

300003Y: Activities in university and student organizations, 1 - 4 op
 750033Y: Tutorial for new students, 1 op

Other Studies

Other studies (vähintään 16 op)

Compulsory

806119P: A Second Course in Statistics, 5 op
 780120P: Basic Principles in Chemistry, 5 op
 030005P: Information Skills, 1 op
 806118P: Introduction to Statistics, 5 op

Optional

B.Sc. Degree in Biology (Bioscience)

Tutkintorakenteen tila: archived

Lukuvuosi: 2016-17

Lukuvuoden alkamispäivämäärä: 01.08.2016

Biology, major subject (vähintään 79 op)

In the biology degree programme the line of study and the major subject in the Bachelor of Science degree is biology.

Basic Studies in Biology

750124P: Basics of ecology, 5 op

750121P: Cell biology, 5 op

757109P: Concepts of genetics, 5 op

Intermediate Studies in Biology

755323A: Animal physiology, 5 op

750366A: Bachelor of Science final examination, 5 op

750332A: Bachelor of Science maturity exam, 0 op

750376A: Bachelor of Science seminar and thesis, 10 op

750373A: Biogeography, 5 op

755320A: Developmental biology-histology, lectures, 5 op

750372A: Evolution and systematics of organisms, 5 op

750336A: Evolutionary ecology, 5 op

755333A: Identification of animals, 6 op

Compulsory

755333A-01: Basic identification of animals, vertebrate, 0 op

755333A-02: Basic identification of animals, invertebrate, 0 op

756342A: Identification of plant species, 3 - 4 op

757312A: Molecular evolution, 5 op

756346A: Plant biology lectures, 5 op

756353A: Plant developmental biology, 5 op

Optional Studies in Biology

Bioscience, minor studies (vähintään 25 op)

Student will choose major subject biology and other minor subject in biology (bioscience or ecology) to their B.Sc. degree. The selection of minor subject will already direct the student towards the line of study and the major subject of the M.Sc. studies (bioscience: genetics and physiology).

Compulsory

755327A: Animal physiology exercises, 5 op

757314A: Basics of bioinformatics, 5 op

757110P: Experimental course in general genetics, 5 op

757311A: Molecular methods I, 5 op

756341A: Plant biology practicals, 5 op

Optional

757313A: Basics in population genetics, 5 op

752388A: Basics of plant tissue culture, 5 op
 751384A: Comparative animal physiology, 8 op
 750349A: Examinations on optional topics in biology, 2 - 10 op
 756304A: Plant ecophysiology in changing environments, 5 op
 750313A: Research training, 2 - 15 op
 750377A: Winter ecology and physiology, 5 op
 750380A: Working knowledge, 1 - 5 op

Other compulsory minor subject (vähintään 25 op)

Biochemistry

740144P: Biochemical Methodologies I, 8 op
 740147P: Biomolecules for Bioscientists, 8 op
 740149P: Metabolism I, 4 op
 740374A: Microbiology, 3 op
 740373A: Molecular Biology I, 4 op

Other minor subject

General studies, Language and Communication Studies (vähintään 7 op)

Compulsory

902002Y: English 1 (Reading for Academic Purposes), 2 op
 902004Y: English 2 (Scientific Communication), 2 op
 750031Y: Orientation course for new students, 1 op
 901004Y: Swedish, 2 - 3 op

Optional

300003Y: Activities in university and student organizations, 1 - 4 op
 750033Y: Tutorial for new students, 1 op

Other studies (vähintään 20 op)

Compulsory

806119P: A Second Course in Statistics, 5 op
 780120P: Basic Principles in Chemistry, 5 op
 030005P: Information Skills, 1 op
 780116P: Introduction to Organic Chemistry, 5 op
 806118P: Introduction to Statistics, 5 op

Optional

B.Sc. Degree in Biology (Subject Teacher, Ecology)

Tutkintorakenteen tila: published

Lukuvuosi: 2016-17

Lukuvuoden alkamispäivämäärä: 01.08.2016

Biology, major studies (vähintään 74 op)

In the biology degree programme the line of study and the major subject in the Bachelor of Science degree is biology.

Basic Studies in Biology

750124P: Basics of ecology, 5 op
 750121P: Cell biology, 5 op
 757109P: Concepts of genetics, 5 op
 757110P: Experimental course in general genetics, 5 op

Intermediate Studies in Biology

755323A: Animal physiology, 5 op
 750366A: Bachelor of Science final examination, 5 op
 750332A: Bachelor of Science maturity exam, 0 op
 750376A: Bachelor of Science seminar and thesis, 10 op
 750373A: Biogeography, 5 op
 755320A: Developmental biology-histology, lectures, 5 op
 750372A: Evolution and systematics of organisms, 5 op
 755333A: Identification of animals, 6 op

Compulsory

755333A-01: Basic identification of animals, vertebrate, 0 op
 755333A-02: Basic identification of animals, invertebrate, 0 op
 756342A: Identification of plant species, 3 - 4 op
 756346A: Plant biology lectures, 5 op

Optional Studies in Biology

755321A: Field course in aquatic animals, 5 op
 755322A: Field course in terrestrial animals, 5 op

Optional Studies in Biology

Ecology, minor studies (vähintään 25 op)

Student will choose major subject biology and other minor subject in biology (bioscience or ecology) to their B.Sc. degree. The selection of minor subject will already direct the student towards the line of study and the major subject of the M.Sc. studies (ecology).

Compulsory

756343A: Field course in ecological botany, 5 op

Optional

751366A: Animal behaviour, 5 op
 756351A: Basics in population ecology, 5 op
 756348A: Ecological responses to global change and air pollution in the subarctic, 5 - 8 op
 750374A: Evolution, systematics and morphology of organisms, 3 op
 750336A: Evolutionary ecology, 5 op
 755321A: Field course in aquatic animals, 5 op
 755322A: Field course in terrestrial animals, 5 op
 755313A: Field identification of birds, 1 - 5 op
 755324A: Functional animal ecology, 5 op
 754322A: Introduction to hydrobiology, 5 op
 755325A: Methods in ecology I, 5 op
 755329A: Methods in ecology II, 5 op
 756344A: Plant ecology, 5 op
 756304A: Plant ecophysiology in changing environments, 5 op
 750313A: Research training, 2 - 15 op
 755328A: Wildlife management and game animal ecology, 5 op
 750377A: Winter ecology and physiology, 5 op

Subsidiary Entity for Subject Teacher (vähintään 25 op)

For the subsidiary entity for subject teacher minimum 25 credits are completed in the B. Sc. degree and 25-35 credits in the M. Sc. degree. OodiHOPS presents teacher specialisation major biology - minor geography.

Geography (subsidiary entity for subject teacher)

Other Subsidiary Entity for Subject Teacher

Pedagogical Studies (30 op)

For more information, see: [Subject Teacher Education](#) at the Faculty of Education. Search courses from the course list and add courses needed to your PSP.

410067P: Basic course in education, 4 op
 050081A: Basic teaching practice, 5 op
 410068P: Didactics, 4 op
 410069P: Educational psychology, 4 op
 050091A: Optional studies, 3 op
 410083P: Pedagogical seminar, 3 op

General studies, Language and Communication Studies (vähintään 7 op)

Compulsory

902002Y: English 1 (Reading for Academic Purposes), 2 op
 902004Y: English 2 (Scientific Communication), 2 op
 750031Y: Orientation course for new students, 1 op
 901035Y: Second Official Language (Swedish), Oral Skills, 1 op
 901034Y: Second Official Language (Swedish), Written Skills, 1 op

optional

300003Y: Activities in university and student organizations, 1 - 4 op
 750033Y: Tutorial for new students, 1 op

Other studies (vähintään 16 op)

Compulsory

806119P: A Second Course in Statistics, 5 op
 780120P: Basic Principles in Chemistry, 5 op
 030005P: Information Skills, 1 op
 806118P: Introduction to Statistics, 5 op

Optional

B.Sc. Degree in Biology (Subject Teacher, Bioscience)

Tutkintorakenteen tila: published

Lukuvuosi: 2016-17

Lukuvuoden alkamispäivämäärä: 01.08.2016

Biology, major studies (vähintään 79 op)

In the biology degree programme the line of study and the major subject in the Bachelor of Science degree is biology.

Basic Studies in Biology

- 750124P: Basics of ecology, 5 op
- 750121P: Cell biology, 5 op
- 757109P: Concepts of genetics, 5 op
- 757110P: Experimental course in general genetics, 5 op

Intermediate Studies in Biology

- 755323A: Animal physiology, 5 op
- 750366A: Bachelor of Science final examination, 5 op
- 750332A: Bachelor of Science maturity exam, 0 op
- 750376A: Bachelor of Science seminar and thesis, 10 op
- 750373A: Biogeography, 5 op
- 755320A: Developmental biology-histology, lectures, 5 op
- 750372A: Evolution and systematics of organisms, 5 op
- 756343A: Field course in ecological botany, 5 op
- 755333A: Identification of animals, 6 op

Compulsory

- 755333A-01: Basic identification of animals, vertebrate, 0 op
- 755333A-02: Basic identification of animals, invertebrate, 0 op
- 756342A: Identification of plant species, 3 - 4 op
- 756346A: Plant biology lectures, 5 op

Optional Studies in Biology

- 755321A: Field course in aquatic animals, 5 op
- 755322A: Field course in terrestrial animals, 5 op

Optional Studies in Biology

Bioscience, minor studies (vähintään 25 op)

Student will choose major subject biology and other minor subject in biology (bioscience or ecology) to their B.Sc. degree. The selection of minor subject will already direct the student towards the line of study and the major subject of the M.Sc. studies (bioscience: genetics and physiology).

Compulsory

- 757110P: Experimental course in general genetics, 5 op

Optional

- 757313A: Basics in population genetics, 5 op
- 757314A: Basics of bioinformatics, 5 op
- 752388A: Basics of plant tissue culture, 5 op
- 757312A: Molecular evolution, 5 op
- 757311A: Molecular methods I, 5 op
- 756341A: Plant biology practicals, 5 op
- 756353A: Plant developmental biology, 5 op
- 756304A: Plant ecophysiology in changing environments, 5 op
- 750313A: Research training, 2 - 15 op
- 750377A: Winter ecology and physiology, 5 op

Subsidiary Entity for Subject Teacher (vähintään 25 op)

For the subsidiary entity for subject teacher minimum 25 credits are completed in the B. Sc. degree and 25-35 credits in the M. Sc. degree. OodiHOPS presents teacher specialisation major biology - minor geography.

Geography (subsidiary entity for subject teacher)

Other Subsidiary Entity for Subject Teacher

Pedagogical Studies (vähintään 30 op)

For more information, see: [Subject Teacher Education](#) at the Faculty of Education.
Search courses from the course list and add courses to your PSP.

410067P: Basic course in education, 4 op
050081A: Basic teaching practice, 5 op
410068P: Didactics, 4 op
410069P: Educational psychology, 4 op
050091A: Optional studies, 3 op
410083P: Pedagogical seminar, 3 op

General studies, Language and Communication Studies (vähintään 7 op)

Compulsory

902002Y: English 1 (Reading for Academic Purposes), 2 op
902004Y: English 2 (Scientific Communication), 2 op
750031Y: Orientation course for new students, 1 op
901035Y: Second Official Language (Swedish), Oral Skills, 1 op
901034Y: Second Official Language (Swedish), Written Skills, 1 op

Optional

300003Y: Activities in university and student organizations, 1 - 4 op
750033Y: Tutorial for new students, 1 op

Other studies (vähintään 16 op)

Compulsory

806119P: A Second Course in Statistics, 5 op
780120P: Basic Principles in Chemistry, 5 op
030005P: Information Skills, 1 op
806118P: Introduction to Statistics, 5 op

Optional

M.Sc. Degree in Biology (Ecology). Major studies minimum 80 ECTS.

Tutkintorakenteen tila: published

Lukuvuosi: 2016-17

Lukuvuoden alkamispäivämäärä: 01.08.2016

Compulsory major studies (vähintään 70 op)

755626S: Advanced population ecology, 6 op

755630S: Community ecology, 5 op
 750656S: Final examination in biology, 10 op
 750678S: Master of science seminar, 5 op
 750632S: Maturity exam, 0 op
 750615S: Practical training, 10 - 15 op
 750658S: Pro gradu thesis in biology, 40 op

Compulsory major studies in specialization area (Animal Ecology/Plant Ecology) (2 - 4 op)

Compulsory major studies / Specialization in Animal Ecology

751666S: Animal behaviour, 5 op
 751642S: Identification of vertebrates in the field, 2 op

Compulsory major studies / Specialization in Plant Ecology

Optional major studies (vähintään 42 op)

NB. You can choose following courses only if they are not included in Bachelor's Degree:

- 755642S Funktionaalinen eläinekologia
- 755628S Riistaeläinekologia
- 750677S Talviekologia ja -fysiologia
- 756604S Kasvien ekofysiologia
- 754322A Hydrobiologian perusteet

H750700: Optional advanced level studies in ecology major, 35 - 60 op

Optional biology minor (vähintään 15 op)

Biology student can take optional minor in bioscience (is granted only for the biology degree students).

Studies of 15 ECTS credits or more entitles for the mark and grade of a minor subject. Courses can be basic, intermediate or advanced level studies.

Optional minor (vähintään 15 op)

Minimum 15 ECTS credits are required for minor at the Faculty of Science degree programme subjects (term: STUDIES) or minimum 25 ECTS credits (term: MINOR).

Other studies

300003Y: Activities in university and student organizations, 1 - 4 op
 300002M: Advanced Information Skills, 1 op
 790101P: GIS-basics and Cartography, 5 op
 757311A: Molecular methods I, 5 op
 750033Y: Tutorial for new students, 1 op

Bridge studies (enintään 60 op)

Bridge studies concern students who have already done applicable lower or higher university degree. Faculty of Science may require the student to do bridge studies maximum 60 ECTS credits in consequence of the differences in the curriculum and to provide the student ability to do the new degree. Bridge studies are case-specific.

Bridge studies are not included to the minimum extent of the M.Sc. degree.

M.Sc. Degree in Biology (Genetics and Physiology). Major studies minimum 80 ECTS.

Tutkintorakenteen tila: published

Lukuvuosi: 2016-17

Lukuvuoden alkamispäivämäärä: 01.08.2016

Compulsory major studies (vähintään 70 op)

750656S: Final examination in biology, 10 op

750678S: Master of science seminar, 5 op

750632S: Maturity exam, 0 op

757617S: Molecular methods II, 5 op

750615S: Practical training, 10 - 15 op

750658S: Pro gradu thesis in biology, 40 op

Compulsory major studies / Specialization in Genetics/Plant Physiology (vähintään 10 op)

Compulsory major studies / Specialization in Genetics

757613S: Basics in population genetics, 5 op

757618S: DNA analysis in population genetics, 10 op

Compulsory major studies / Specialization in Plant Physiology

752682S: Advanced course in plant biology, 9 op

752688S: Basics of tissue culture, 5 op

756652S: Genetic transformation of plants, 5 - 8 op

Compulsory major studies / Specialization in Animal Physiology

751635S: Advanced course in animal physiology, 8 op

751684S: Comparative animal physiology, 8 op

Optional major studies (vähintään 42 op)

NB. You can choose following courses only if they are not included in Bachelor's Degree:

- 755642S Funktionaalinen eläinekologia
- 755628S Riistaeläinekologia
- 750677S Talviekologia ja -fysiologia
- 756604S Kasvien ekofysiologia
- 754322A Hydrobiologian perusteet

H750750: Optional advanced level studies in Genetics and Physiology, 35 - 60 op

Choose from

750653S: Special seminar in biology, 2 - 5 op

750654S: Special lecture in biology, 2 - 5 op

757615S: Human genetics, 5 op

757619S: Advanced course in bioinformatics, 5 op

757621S: Experimental course in evolutionary genomics, 5 op

757620S: Methods in genomics and genomics evolution, 5 op

757616S: Quantitative genetics and plant and animal breeding, 5 op

756627S: Plant hormones, 5 op

756615S: Physiology of forest trees, 5 op

756604S: Plant ecophysiology in changing environments, 5 op

756626S: Stress physiology of plants, 4 op

756649S: Symbiosis, 5 op

750677S: Winter ecology and physiology, 5 op

Optional advanced level studies (min. 10 cr) (vähintään 10 op)

Optional biology minor (vähintään 15 op)

Biology student can take optional minor in bioscience (is granted only for the biology degree students).

Studies of 15 ECTS credits or more entitles for the mark and grade of a minor subject. Courses can be basic, intermediate or advanced level studies.

Optional minor (vähintään 15 op)

Minimum 15 ECTS credits are required for minor at the Faculty of Science degree programme subjects (term: STUDIES) or minimum 25 ECTS credits (term: MINOR).

Other studies (vähintään 1 op)

300002M: Advanced Information Skills, 1 op

Bridge studies (enintään 60 op)

Bridge studies concern students who have already done applicable lower or higher university degree. Faculty of Science may require the student to do bridge studies maximum 60 ECTS credits in consequence of the differences in the curriculum and to provide the student ability to do the new degree. Bridge studies are case-specific.

Bridge studies are not included to the minimum extent of the M.Sc. degree.

M.Sc. Degree in Biology (Subject Teacher, Ecology). Major studies minimum 60 ECTS.

Tutkintorakenteen tila: published

Lukuvuosi: 2016-17

Lukuvuoden alkamispäivämäärä: 01.08.2016

Compulsory major studies in Ecology (vähintään 55 op)

750656S: Final examination in biology, 10 op

750678S: Master of science seminar, 5 op

750632S: Maturity exam, 0 op

750658S: Pro gradu thesis in biology, 40 op

Compulsory other major studies (vähintään 5 op)

H750900: Subject teacher's optional advanced level studies in ecology major, 5 - 80 op

Choose from

750615S: Practical training, 10 - 15 op

755626S: Advanced population ecology, 6 op

755630S: Community ecology, 5 op

751642S: Identification of vertebrates in the field, 2 op

751666S: Animal behaviour, 5 op
 750653S: Special seminar in biology, 2 - 5 op
 750654S: Special lecture in biology, 2 - 5 op
 757619S: Advanced course in bioinformatics, 5 op
 756648S: Ecological responses to global change and air pollution in the subarctic, 5 - 8 op
 754626S: Field methods in freshwater biomonitoring, 5 op
 751651S: Advanced identification in animals, 4 - 8 op
 751660S: Preparation of an insect collection, 2 - 6 op
 756650S: Introduction to molecular ecology, 5 op
 752642S: Field course in arctic-alpine ecology and vegetation, 5 op
 752692S: Mire ecology, 5 op
 752616S: Macro fungi, 3 op
 752656S: Taxonomy and ecology of plants, 2 - 4 op
 752608S: Advanced identification of plant species I, 6 op
 752625S: Advanced identification of plant species II, 5 - 8 op
 752672S: Distribution mapping of plants, 2 - 5 op
 755624S: Functional animal ecology, 5 op
 755608S: Bird ecology and conservation, 2 op
 754628S: Stream ecology, 5 op
 754627S: Special course in aquatic invertebrates, 5 op
 754625S: Assessment and monitoring of the ecological status of water bodies, 5 op
 755628S: Wildlife management and game animal ecology, 5 op
 750626S: Environmental impact assessment (EIA) and ecological inventory of natural resources, 5 op
 750616S: Legislation in environmental protection, 5 op
 755632S: Restoration ecology, 5 op
 750677S: Winter ecology and physiology, 5 op
 756612S: Soil ecology, 3 - 5 op
 756604S: Plant ecophysiology in changing environments, 5 op
 756649S: Symbiosis, 5 op

Subsidiary Entity for Subject Teacher (vähintään 35 op)

For the subsidiary entity for subject teacher minimum 25 credits are completed in the B. Sc. degree and 25-35 credits in the M. Sc. degree. OodiHOPS presents teacher specialisation major biology - minor geography.

Geography (subsidiary entity for subject teacher)

Other Subsidiary Entity for Subject Teacher

Pedagogical studies (vähintään 30 op)

A251104: Pedagogical Studies in Master's Degree, 25 - 30 op

Pakollinen

410070P: Sociology of education, 4 op
 410071P: Educational philosophy, 4 op
 050410A: Research in subject didactics, 8 op
 416004A: Basics of educational administration, 2 op
 050085A: Special education, 1 op
 050082A: Advanced teaching practice I, 6 op
 050083A: Advanced teaching practice II, 6 op

Other studies

300003Y: Activities in university and student organizations, 1 - 4 op
 300002M: Advanced Information Skills, 1 op
 750033Y: Tutorial for new students, 1 op

Bridge studies (enintään 60 op)

Bridge studies concern students who have already done applicable lower or higher university degree. Faculty of Science may require the student to do bridge studies maximum 60 ECTS credits in consequence of the differences in the curriculum and to provide the student ability to do the new degree. Bridge studies are case-specific.

Bridge studies are not included to the minimum extent of the M.Sc. degree.

M.Sc. Degree in Biology (Subject Teacher, Bioscience). Major studies minimum 60 ECTS.

Tutkintorakenteen tila: published

Lukuvuosi: 2016-17

Lukuvuoden alkamispäivämäärä: 01.08.2016

Compulsory major studies in Ecology (vähintään 55 op)

750656S: Final examination in biology, 10 op

750678S: Master of science seminar, 5 op

750632S: Maturity exam, 0 op

750658S: Pro gradu thesis in biology, 40 op

Compulsory other major studies (vähintään 5 op)

H750950: Subject teacher's optional advanced level studies in bioscience major, 5 - 80 op

Chose from

757617S: Molecular methods II, 5 op

757613S: Basics in population genetics, 5 op

757618S: DNA analysis in population genetics, 10 op

752688S: Basics of tissue culture, 5 op

750653S: Special seminar in biology, 2 - 5 op

750654S: Special lecture in biology, 2 - 5 op

757615S: Human genetics, 5 op

757619S: Advanced course in bioinformatics, 5 op

757621S: Experimental course in evolutionary genomics, 5 op

757620S: Methods in genomics and genomics evolution, 5 op

757616S: Quantitative genetics and plant and animal breeding, 5 op

756627S: Plant hormones, 5 op

756615S: Physiology of forest trees, 5 op

756604S: Plant ecophysiology in changing environments, 5 op

756626S: Stress physiology of plants, 4 op

756649S: Symbiosis, 5 op

750677S: Winter ecology and physiology, 5 op

Subsidiary Entity for Subject Teacher (vähintään 35 op)

For the subsidiary entity for subject teacher minimum 25 credits are completed in the B. Sc. degree and 25-35 credits in the M. Sc. degree. OodiHOPS presents teacher specialisation major biology - minor geography.

Geography (subsidiary entity for subject teacher)

Other Subsidiary Entity for Subject Teacher

Pedagogical studies (vähintään 30 op)

A251104: Pedagogical Studies in Master's Degree, 25 - 30 op

Pakollinen

- 410070P: Sociology of education, 4 op
- 410071P: Educational philosophy, 4 op
- 050410A: Research in subject didactics, 8 op
- 416004A: Basics of educational administration, 2 op
- 050085A: Special education, 1 op
- 050082A: Advanced teaching practice I, 6 op
- 050083A: Advanced teaching practice II, 6 op

Other studies

- 300003Y: Activities in university and student organizations, 1 - 4 op
- 300002M: Advanced Information Skills, 1 op
- 750033Y: Tutorial for new students, 1 op

Bridge studies (enintään 60 op)

Bridge studies concern students who have already done applicable lower or higher university degree. Faculty of Science may require the student to do bridge studies maximum 60 ECTS credits in consequence of the differences in the curriculum and to provide the student ability to do the new degree. Bridge studies are case-specific.

Bridge studies are not included to the minimum extent of the M.Sc. degree.

M.Sc. Degree in Biology (Subject Teacher, Biology). Major studies minimum 60 ECTS.

Tutkintorakenteen tila: published

Lukuvuosi: 2016-17

Lukuvuoden alkamispäivämäärä: 01.08.2016

Compulsory major studies in Biology (vähintään 35 op)

- 750657S: Biology subject teacher pro gradu thesis, 20 - 40 op
- 750656S: Final examination in biology, 10 op
- 750678S: Master of science seminar, 5 op
- 750632S: Maturity exam, 0 op

Compulsory other major studies (vähintään 5 op)

H750850: Subject teacher's optional advanced level studies in biology major, 5 - 60 op

Choose from

- 755626S: Advanced population ecology, 6 op
- 755630S: Community ecology, 5 op
- 751642S: Identification of vertebrates in the field, 2 op
- 751666S: Animal behaviour, 5 op
- 757617S: Molecular methods II, 5 op
- 757613S: Basics in population genetics, 5 op
- 757618S: DNA analysis in population genetics, 10 op
- 752688S: Basics of tissue culture, 5 op
- 750653S: Special seminar in biology, 2 - 5 op
- 750654S: Special lecture in biology, 2 - 5 op
- 757619S: Advanced course in bioinformatics, 5 op
- 756648S: Ecological responses to global change and air pollution in the subarctic, 5 - 8 op
- 754626S: Field methods in freshwater biomonitoring, 5 op

751651S: Advanced identification in animals, 4 - 8 op
 751660S: Preparation of an insect collection, 2 - 6 op
 756650S: Introduction to molecular ecology, 5 op
 752642S: Field course in arctic-alpine ecology and vegetation, 5 op
 752692S: Mire ecology, 5 op
 752616S: Macro fungi, 3 op
 752656S: Taxonomy and ecology of plants, 2 - 4 op
 752608S: Advanced identification of plant species I, 6 op
 752625S: Advanced identification of plant species II, 5 - 8 op
 752672S: Distribution mapping of plants, 2 - 5 op
 755624S: Functional animal ecology, 5 op
 755608S: Bird ecology and conservation, 2 op
 754628S: Stream ecology, 5 op
 754627S: Special course in aquatic invertebrates, 5 op
 754625S: Assessment and monitoring of the ecological status of water bodies, 5 op
 755628S: Wildlife management and game animal ecology, 5 op
 750626S: Environmental impact assessment (EIA) and ecological inventory of natural resources, 5 op
 750616S: Legislation in environmental protection, 5 op
 755632S: Restoration ecology, 5 op
 750677S: Winter ecology and physiology, 5 op
 756612S: Soil ecology, 3 - 5 op
 756604S: Plant ecophysiology in changing environments, 5 op
 756649S: Symbiosis, 5 op
 757615S: Human genetics, 5 op
 757621S: Experimental course in evolutionary genomics, 5 op
 757620S: Methods in genomics and genomics evolution, 5 op
 757616S: Quantitative genetics and plant and animal breeding, 5 op
 756627S: Plant hormones, 5 op
 756615S: Physiology of forest trees, 5 op
 756626S: Stress physiology of plants, 4 op

Subsidiary Entity for Subject Teacher (vähintään 35 op)

For the subsidiary entity for subject teacher minimum 25 credits are completed in the B. Sc. degree and 25-35 credits in the M. Sc. degree. OodiHOPS presents teacher specialisation major biology - minor geography.

Geography (subsidiary entity for subject teacher)

Other Subsidiary Entity for Subject Teacher

Pedagogical studies (vähintään 30 op)

A251104: Pedagogical Studies in Master's Degree, 25 - 30 op

Pakollinen

410070P: Sociology of education, 4 op
 410071P: Educational philosophy, 4 op
 050410A: Research in subject didactics, 8 op
 416004A: Basics of educational administration, 2 op
 050085A: Special education, 1 op
 050082A: Advanced teaching practice I, 6 op
 050083A: Advanced teaching practice II, 6 op

Other studies

300003Y: Activities in university and student organizations, 1 - 4 op
 300002M: Advanced Information Skills, 1 op
 750033Y: Tutorial for new students, 1 op

Bridge studies (enintään 60 op)

Bridge studies concern students who have already done applicable lower or higher university degree. Faculty of Science may require the student to do bridge studies maximum 60 ECTS credits in consequence of the differences in the curriculum and to provide the student ability to do the new degree. Bridge studies are case-specific.

Bridge studies are not included to the minimum extent of the M.Sc. degree.

International Master's Degree Programme in Ecology and Population Genetics (Major in Ecology)

Tutkintorakenteen tila: published

Lukuvuosi: 2016-17

Lukuvuoden alkamispäivämäärä: 01.08.2016

Compulsory major studies (vähintään 55 op)

750656S: Final examination in biology, 10 op

750678S: Master of science seminar, 5 op

750632S: Maturity exam, 0 op

750658S: Pro gradu thesis in biology, 40 op

Compulsory major studies in Ecology (vähintään 15 op)

756650S: Introduction to molecular ecology, 5 op

755625S: Methods in ecology I, 5 op

755629S: Methods in ecology II, 5 op

Optional major studies in Ecology (vähintään 10 op)

NB. You can choose following courses only if they are not included in Bachelor's Degree:

- 755642S Funktionaalinen eläinekologia
- 755628S Riistaeläinekologia
- 750677S Talviekologia ja -fysiologia
- 756604S Kasvien ekofysiologia
- 754322A Hydrobiologian perusteet

H750600: EcoGen optional advanced level studies in ecology major, 10 - 80 op

Choose from

750653S: Special seminar in biology, 2 - 5 op

750654S: Special lecture in biology, 2 - 5 op

750615S: Practical training, 10 - 15 op

750613S: Research training, 2 - 15 op

750661S: Research group seminar, 2 - 4 op

750618S: Thursday seminar in biology, 2 op

750629S: Kaamos symposium, 2 - 4 op

755633S: Identification of animals, 6 op

750649S: Examinations on optional topics in biology, 2 - 10 op

750699S: Optional examinations in environmental protection, 2 - 6 op

755621S: Field course in aquatic animals, 5 op

755622S: Field course in terrestrial animals, 5 op

756647S: Conservation of biodiversity, 5 op

755632S: Restoration ecology, 5 op

750677S: Winter ecology and physiology, 5 op

756648S: Ecological responses to global change and air pollution in the subarctic, 5 - 8 op

755624S: Functional animal ecology, 5 op

755628S: Wildlife management and game animal ecology, 5 op
 756644S: Plant ecology, 5 - 7 op
 756642S: Identification of plant species, 3 - 4 op
 756643S: Field course in ecological botany, 5 op
 756612S: Soil ecology, 3 - 5 op
 756604S: Plant ecophysiology in changing environments, 5 op
 752616S: Macro fungi, 3 op
 752656S: Taxonomy and ecology of plants, 2 - 4 op
 752608S: Advanced identification of plant species I, 6 op
 752625S: Advanced identification of plant species II, 5 - 8 op
 752662S: Botanical collection and digital herbarium, 2 - 6 op
 756649S: Symbiosis, 5 op

Optional Biology minor (vähintään 15 op)

Biology student can take optional minor in bioscience (is granted only for the biology degree students).

Studies of 15 ECTS credits or more entitles for the mark and grade of a minor subject. Courses can be basic, intermediate or advanced level studies.

Other studies (vähintään 5 op)

030008P: Information Skills for foreign degree students, 1 op
 757611S: Molecular methods I, 5 op

International Master's Degree Programme in Ecology and Population Genetics (Major in Genetics)

Tutkintorakenteen tila: published

Lukuvuosi: 2016-17

Lukuvuoden alkamispäivämäärä: 01.08.2016

Compulsory major studies (vähintään 55 op)

750656S: Final examination in biology, 10 op
 750678S: Master of science seminar, 5 op
 750632S: Maturity exam, 0 op
 750658S: Pro gradu thesis in biology, 40 op

Compulsory major studies in Genetics (vähintään 20 op)

757613S: Basics in population genetics, 5 op
 757618S: DNA analysis in population genetics, 10 op
 757611S: Molecular methods I, 5 op

Optional major studies in Genetics (vähintään 5 op)

NB. You can choose following courses only if they are not included in Bachelor's Degree:

- 755642S Funktionaalinen eläinekologia
- 755628S Riistaeläinekologia
- 750677S Talviekologia ja -fysiologia
- 756604S Kasvien ekofysiologia

- 754322A Hydrobiologian perusteet

H750650: EcoGen optional advanced level studies in Genetics major, 5 - 80 op

Choose from

- 750653S: Special seminar in biology, 2 - 5 op
- 750654S: Special lecture in biology, 2 - 5 op
- 750615S: Practical training, 10 - 15 op
- 750613S: Research training, 2 - 15 op
- 750661S: Research group seminar, 2 - 4 op
- 750618S: Thursday seminar in biology, 2 op
- 750629S: Kaamos symposium, 2 - 4 op
- 750649S: Examinations on optional topics in biology, 2 - 10 op
- 757614S: Basics of bioinformatics, 5 op
- 757619S: Advanced course in bioinformatics, 5 op
- 757621S: Experimental course in evolutionary genomics, 5 op
- 757620S: Methods in genomics and genomics evolution, 5 op

Optional Biology minor (vähintään 15 op)

Biology student can take optional minor in ecology (is granted only for the biology degree students).

Studies of 15 ECTS credits or more entitles for the mark and grade of a minor subject. Courses can be basic, intermediate or advanced level studies.

Other studies (vähintään 1 op)

- 300002M: Advanced Information Skills, 1 op
- 030008P: Information Skills for foreign degree students, 1 op

Tutkintorakenteisiin kuulumattomat opintokokonaisuudet ja -jaksot

- 750376A-01: Bachelor of Science seminar and thesis, scientific writing, 0 op
- 750376A-03: Bachelor of Science seminar and thesis, thesis, 0 op
- 750376A-02: Bachelor of Science seminar and thesis, workshop, 0 op
- 755631S: Biodiversity in human changed environments, 5 op
- 750373A-01: Biogeography, animals, 0 op
- 750373A-02: Biogeography, plants, 0 op
- 752362A: Botanical collection, 2 - 6 op
- 750121P-02: Cell biology, Botany, 0 op
- 750121P-03: Cell biology, Genetics, 0 op
- 750121P-01: Cell biology, Zoology, 0 op
- 757122P: Concepts of genetics for biochemists, 3 op
- 756347A: Conservation of biodiversity, 5 op
- 755320A-01: Developmental biology-histology, Developmental biology lectures, 0 op
- 755317A: Developmental biology-histology, exercises, 5 op
- 755320A-02: Developmental biology-histology, histology lectures, 0 op
- 752175P: Environmental ecology, 5 op
- 750149P: Examinations on optional topics in biology, 2 - 10 op
- 752342A: Field course in arctic-alpine ecology and vegetation, 5 op
- 754623S: Final examination in hydrobiology, 5 op
- 757315A: Human genetics, 5 op
- 751673S: Identification of animals, 5 op
- 756311A: Identification of garden plant species, 5 op
- 756650S-02: Introduction to molecular ecology, exercises, 0 op
- 756650S-01: Introduction to molecular ecology, lectures, 0 op

750329A: Kaamos-symposium, 2 op
 750316A: Legislation in environmental protection, 5 op
 752316A: Macro fungi, 3 op
 750179P: Minor subject examination in biology, 5 op
 752392A: Mire ecology, 5 op
 750399A: Optional examinations in environmental protection, 2 - 6 op
 750199P: Optional examinations in environmental protection, 2 - 6 op
 756622S: Structure and dynamics of plant communities, 5 op
 750133P: Studies in biology abroad, 1 - 60 op
 750333A: Studies in biology abroad, 1 - 60 op
 750633S: Studies in biology abroad, 1 - 60 op
 750155P: Studies in biology in other Finnish universities, 1 - 60 op
 750355A: Studies in biology in other Finnish universities, 1 - 60 op
 750655S: Studies in biology in other Finnish universities, 1 - 60 op
 750318A: Thursday seminar in biology, 2 op

Opintojaksojen kuvaukset

Tutkintorakenteisiin kuuluvien opintokohteiden kuvaukset

750124P: Basics of ecology, 5 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Jari-Heikki Oksanen, Orell, Markku Ilmari

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 1st spring.

Learning outcomes:

After completion of the course both biology and minor studies students understand better function of nature and the ecological phenomena in individual, population, community and ecosystem level.

Contents:

The course gives a student a basic idea about ecological interactions in individual-, population-, community- and ecosystem levels. In individual level the focus is on environmental demands of plants and animals. In population level the birth- and death rate of age groups and their effect on population growth is focused. In interactions between different species the emphasis is on how the competition between species leads to differentiation of niches. Predation is viewed as the regulatory effect on the population dynamics of prey populations. In community level the biodiversity and the patterns of succession are the main questions. In ecosystem level the emphasis is on energy flows and nutrient cycling. Evolution and adaptation are important in different fields of ecology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

The course is divided into three parts which follow the course book Krebs, C. J. 2009: Ecology (6 th edition). 1 st part: 24 hours of lectures based mainly on parts 1-2 of the course book. 2 nd part: 24 hours of lectures are based on part 3 of the course book. 3 rd part: students read the part 4 from the course book. In the course exam, there will be three questions, one from each part and all the questions have to be passed.

Target group:

Compulsory biology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Krebs, C. J. 2009: Ecology (6th edition). Part I.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Markku Orell and Prof. Jari Oksanen.

Working life cooperation:

No.

Other information:

-

750121P: Cell biology, 5 op

Voimassaolo: - 31.07.2020

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Häggman, Hely Margaretha, Henrika Honkanen, Kuittinen, Helmi Helena, Jaana Jurvansuu

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 1st autumn.

Learning outcomes:

The student is familiar with cellular structure and functioning in plant and animal cells, understands the social structures in multicellular species and knows why and how the genetic organizations (in nucleus, chloroplast and mitochondria) are co-operating, maintaining and regulating the cellular metabolism. Student understands the common origin and evolution of life on planet Earth, and understands the material basis and mechanisms of this continuity.

Contents:

During the recent years especially the development of molecular and microscopic and imaging techniques has increased our knowledge on cells and their social interactions. The structural and functional characteristics of plant and animal cells will be covered as well as the genetic organization maintaining and regulating the system.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

50 h lectures, three exams (zoology, plant biology, genetics). Home essays and internet material.

Target group:

Compulsory to the biology and biochemistry students.

Prerequisites and co-requisites:

Good basics in biology from elementary school.

Recommended optional programme components:

Cell biology is prerequisite for the following courses: Developmental biology-histology (755320A), Animal physiology (755323A), Plant biology lectures (756346A), Concepts of genetics (757109P). Course also gives readiness for studies in molecular biology and biochemistry.

Recommended or required reading:

Suitable parts of Campbell et al. 2014: Biology: a global approach (10e), Pearson, 1350 s. 978-1-292-00865-3, Alberts, B. et al. 2014: Molecular Biology of the Cell (6e), Garland Science Publishing, London, 1464 s. ISBN: 9780815345244 (or Lodish et al. 2012: Molecular Cell Biology (7e). Freeman, 973 s. ISBN-10: 1-4292-3413-X),

Heino J. & Vuento M. 2014: Biokemian ja solubiologian perusteet (3. painos) WSOY Pro Oy, Helsinki, Jones R. et al. 2013: The molecular life of plants. Wiley-Blackwell, 742 s. ISBN : 978-0-470-87012-9.
The availability of the literature can be checked from [this link](#).

[\[HK1\]](#)linkkiä en osannut uudistaa

Assessment methods and criteria:

Three exams.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail. Final grade is average value of the three exams.

Person responsible:

Dr. Jaana Jurvansuu, Dr. Helmi Kuittinen and Prof. Hely Häggman.

Working life cooperation:

No.

Other information:

-

757109P: Concepts of genetics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Savolainen Outi

Opintokohteen kielet: Finnish

Leikkaavuudet:

757122P Concepts of genetics for biochemists 3.0 op

753124P Concepts of genetics 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 1 st spring.

Learning outcomes:

To understand and apply basic concepts of genetics, at Mendelian and molecular level.

Contents:

Part 1. Mendelian genetics, including the ideas of quantitative and population genetics. Part 2. Molecular genetics: replication, transcription, translation, genetic code, mutations, repair of DNA. Part 3. Selected topics on developmental genetics, and genetics of health and diseases.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

50 h lectures and seminars, 83 h independent studies, exam.

Target group:

Compulsory to the biology students (5 cr) Biochemistry students: parts 1 and 3 (3 cr) compulsory.

Prerequisites and co-requisites:

Cell biology (750121P) or equivalent knowledge.

Recommended optional programme components:

This course is prerequisite to all other genetics courses.

Recommended or required reading:

Materials are in Optima. Klug et al. 2012. Concepts of Genetics (10. ed). Pearson, 896 p. Alberts, B. et al. 2008: Molecular Biology of the Cell (5. ed). Garland Science Publishing, London, 1268 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Homeworks, home exams, lecture diary, exams.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

757110P: Experimental course in general genetics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kuittinen, Helmi Helena

Opintokohteen kielet: Finnish

Leikkaavuudet:

753104P Experimental course in general genetics 6.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. degree, 1 st spring.

Learning outcomes:

After passing the course students have elementary knowledge of basic phenomena of genetics, important working methods and laboratory organisms. Student has the basic ability to understand, apply and analyse simple genetical works and phenomena.

Contents:

Investigation of Mendelian inheritance, gene mapping and nonadditive effects of genes using cross-breeding; basics of population genetics; investigation of promoter regulation and microbial recombination; investigation of mitosis and meiosis using cytogenetical methods; basic methods of DNA techniques (isolating DNA, digesting DNA using restriction enzymes, PCR and electrophoresis).

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

18 h demonstrations, 45 h exercises, independent work, exam, report.

Target group:

Compulsory for biology students.

Prerequisites and co-requisites:

Concepts of genetics (757109P) or equivalent knowledge.

Recommended optional programme components:

Course is prerequisite to all the following genetics courses.

Recommended or required reading:

Course handout.

Assessment methods and criteria:

Report, final exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Helmi Kuittinen

Working life cooperation:

No.

Other information:

-

755323A: Animal physiology, 5 op

Voimassaolo: 01.08.2015 - 31.07.2020

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

751388A Animal physiology, lectures 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 2nd spring.

Learning outcomes:

After completing the course the student is able to form a general view of animal body functions, the regulation of organ systems, and the background of human health and diseases.

Contents:

Course focus on the basic problematic of physiological themes including nervous system, muscles, circulation, nutrition, metabolism, immune system, hormones and reproduction physiology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

50 h lectures and independent studying, mid-semester exams, home essays.

Target group:

Compulsory to the biology students.

Prerequisites and co-requisites:

Cell biology (750121P) or equivalent knowledge.

Recommended optional programme components:

This course is a prerequisite for the courses Animal physiology, exercises (755318A), Comparative animal physiology (751x84A/S) and Advanced course in animal physiology (751635S).

Recommended or required reading:

Reece, J.B. Urry, L.A. Cain, M.L., Wasserman, S.A. Minorsky, P.V. & Jackson R.B. 2011: Campbell Biology (9e). Pearson, Global Edition, 1309 p, handouts. The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Home essays and exam. Read more about [assessment criteria](#) at the University of Oulu webpage.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Esa Hohtola.

Working life cooperation:

No.

Other information:

-

750366A: Bachelor of Science final examination, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 3rd year.

Learning outcomes:

Student will understand basic methods, results and theories in ecology, physiology or genetics.

Contents:

Examinations on books related to B.Sc. thesis subject. List of books are presented on WebOodi. All the books are recommended to be done on the same exam in Examinarium.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Students make workshops where they discuss content of the books. Book exam (4 h). Exam is held in Examinarium.

Target group:

Compulsory to the biology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

BSz:

- Option 1: Randall etc.: Eckert's Animal Physiology, 5. ed., 2002 or newer, (chapter 4 onwards).
 - Option 2: Richard W. Hill, Gordon A. Wyse, and Margaret Anderson: Animal Physiology, 2. ed., Sinauer Press, 2008.
- Other books can be agreed on special reasons with prof. Esa Hohtola.

BSg

- Klug, W. S., Cummings, M. R., Spencer, C.A ja Palladino M.A.: Concepts of Genetics (11. ed.). Pearson & Prentice Hall, 2015
- Remember to mention the book edition to the teacher which book edition you read.
- responsible teacher dos. Helmi Kuittinen

BSb

- Option 1: Ridge, I. 2002. Plants. Oxford University Press, 344 p. ISBN 0-19-925548-2
- Option 2: Mauseth, J.D. 2009. An introduction to plant biology. 4th ed.
- Other books can be agreed on special reasons with prof. Hely Häggman.

ECOz

Exam book ensemble (5 cr.) is chosen from the following list:

- Bennett, P.M. & Owens, I.P.F. 2002. Evolutionary ecology of birds. Life histories, mating systems and extinction. – Oxford University Press. 206 p. (2 cr)
- Hanski, I. 2007. The Striking world. (2 cr.)
- Davies, N.B. Krebs, J.R. & West, S.A. 2012. An introduction to behavioural ecology. – Blackwell, 441 p. (4 cr).
- Mayr, E. 1999. Biologia. Elämän tie. – Art House, 327 p. (2 cr)
- Primack, R.B. 2012. A primer of conservation biology (4. ed). – 309 p. (2 cr).
- Smith, J.N.M., Keller, L.F., Marr, A.B. & Arcese, P. 2006. Conservation and biology of small populations. – Oxford University Press. 205 p. (2 cr)
- Other books can be agreed on special reasons with prof. Markku Orell

ECOb

- Larcher W. 2003. Physiological Plant Ecology 4th edition, 513 p.
- Ridge I. (Ed.) 2002. Plants. Oxford University Press, 345 p.
- Salonen V. 2006. Kasviekologia. 306 p., WSOY.
- Willis K.J. and McElwain J.C. 2002. The evolution of plants. 378 p. Oxford University Press.
- Scott Peter 2008. Physiology and Behaviour of Plants. Wiley, 305 p.
- Timonen, S & Valkonen, J. 2013. Sienten biologia. Gaudeamus, 448 p.
- Other books can be agreed on special reasons with prof. Jari Oksanen

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Exam in Examinarium.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

M.Sc. Henrika Honkanen, Prof. Hely Häggman, Prof. Jari Oksanen, doc. Helmi Kuittinen and Prof. Markku Orell.

Working life cooperation:

No.

Other information:

-

750332A: Bachelor of Science maturity exam, 0 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

0 ECTS credits / 2-4 hours of work.

Language of instruction:

Finnish / Swedish / English.

Timing:

B.Sc. degree.

Learning outcomes:

The student is well acquainted with the subject of the thesis and shows good first language skills.

Contents:

After completing the Bachelor of Science Thesis, the student writes an essay in his/her native language on the thesis, to show a good command of the language and the topic of the thesis. Maturity exam will be done in Examinarium.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Detailed instructions on Noppa. Four pages long essay exam. One teacher examine the maturity exam and Pro gradu working group accepts it. 4 h exam.

Target group:

Compulsory to the biology students. Exam is taken after completion of the thesis.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Four pages long essay. Done in Examinarium.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

750376A: Bachelor of Science seminar and thesis, 10 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

750396A Bachelor of Science seminar 3.0 op

ECTS Credits:

10 ECTS credits / 267 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 3rd year. BS and ECO: scientific writing and Introduction to information retrieval autumn, workshop spring.

TEA: scientific writing, Introduction to information retrieval and workshop autumn

Learning outcomes:

B.Sc. seminar: Student will know the technical and ethical principles of scientific writing and publishing. She/he has the capability to make a scientific review (BSc thesis) and present it clearly as a poster or an oral presentation. *B.Sc. thesis:* Student is able to plan and write up thesis by getting acquainted to an interesting biology subject and reviewing it critically with the help of relevant scientific source material.

Contents:

Independent research work on a scientific subject in agreement with the responsible professor and under the supervision of the degree programme. The supervisors may be professors of the department, docents and other teachers and researchers who have the docent's status. The student may have several supervisors, the other supervisor may be from other department, university (also abroad) or from research institute. The subject must be agreed on with the professor in advance. The research work can contain fieldwork, laboratory work, theoretical work or work on collections in museum. The work always includes a literature survey. After having completed the thesis, the student writes the Maturity Exam. The dean will order the examiners by the proposal of the professor. Pro gradu working group accepts and grades the thesis on the basis of the examiners' opinions.

List of the actual B.Sc. thesis topics is on Noppa.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

BSc seminar: Info lectures, computer exercises, group and peer support, seminar or poster presentation. BSc thesis: About 15 pages long thesis.

Target group:

Compulsory to the biology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

Done at the same time as B.Sc. seminar workshop in spring, subject teacher students have seminar workshop in the autumn.

Recommended or required reading:

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Assessment methods and criteria:

B.Sc. seminar: Tutorial group and presentation. *B.Sc. thesis:* Thesis.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

B.Sc. seminar: Doc. Seppo Rytönen. *B.Sc. thesis:* Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

750373A: Biogeography, 5 op

Voimassaolo: 01.08.2015 - 31.07.2019

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kvist, Laura Irmeli, Jari-Heikki Oksanen

Opintokohteen kielet: Finnish

Leikkaavuudet:

750173P Biogeography 5.0 op

750363A Biogeography 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 1st autumn.

Learning outcomes:

The course introduces students to basic concepts of biogeography, patterns of distribution and historical and present factors affecting the distribution. Plant biogeography introduces students to modern and historical factors controlling the plant cover, and to the special methods of vegetation science.

Contents:

The course consists of general part and optional part on plant biogeography and vegetation science. The general part introduces basic models and theories of distribution of organisms in the environment. Historical, evolutionary, geographical, climatic and ecological explanations. Research methods used in biogeography. The part on plant biogeography and vegetation science introduces methods on factors controlling the structure and composition of vegetation, and describes major vegetation types in Finland and principal biomes in the World. Methods of vegetation science are briefly surveyed.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

General biogeography: 24 h lectures, independent work (3 cr), **Plant biogeography:** 24 h lectures (2 cr); two exams.

Target group:

Compulsory for biology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

Other recommended courses related to the field: Basics of Ecology (750124P), Evolution and systematics of organisms (750372A), Evolution, systematics and morphology of organisms, practicals (750374A), Biodiversity in human changed environments (755631S).

Recommended or required reading:

Cox, C.B. & Moore, P.D. 2005: Biogeography. An ecological and evolutionary approach (7 ed.), Blackwell Publishing Ltd, or Cox, C.B. & Moore, P.D. 2010: Biogeography. An ecological and evolutionary approach (8 ed.), John Wiley & Sons Inc.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Two exams.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail. Final grade is average value of the two exams.

Person responsible:

Doc. Laura Kvist and Prof. Jari Oksanen.

Working life cooperation:

No.

Other information:

-

755320A: Developmental biology-histology, lectures, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

751367A Developmental biology-histology, lectures 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 1 st spring.

Learning outcomes:

After completing the developmental biology -part of the course the student is able to name the most important events of embryonic development and the structural changes related to them. The student is also able to describe the principles gene regulation related to embryonic development. After completing the histology-part of the course the student is able to describe the various tissue types and the microscopic structure of important organs and is also able to identify tissue types and organs from microscopic sections.

Contents:

Motto: "It is not birth, marriage, or death, but gastrulation, which is truly the most important time in your life." (Lewis Wolpert, 1986). Developmental biology will cover gametogenesis, fertilization, forming of embryonic tissue layers (gastrulation), embryonic induction, signal molecules and the differentiation of the most important tissues and organs (organogenesis). Histology will first cover various tissue types, their cell types and matrix composition. Thereafter, the microscopic structure and tissue composition of various organs and organ systems will be covered. In both parts, practical exercises on drawing from microscopic slides (see 755317A) will support lectures.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

38 h lectures and two exams.

Target group:

Compulsory to biology students.

Prerequisites and co-requisites:

Cell biology (750121P) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Lecture notes, lecture handouts. Recommended reading: Sariola, Frilander ym., Solusta yksilöksi: Kehitysbiologia, Duodecim, Helsinki 2003; Gilbert: Developmental Biology, Sinauer Press, 6.ed. 2000, or newer; Young & Heath: Wheater's Functional Histology, Churchill Livingstone, 4. ed. 2000, or newer. The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

2 lecture exams. Read more about [assessment criteria](#) at the University of Oulu webpage.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

MSc Henrika Honkanen.

Working life cooperation:

No.

Other information:

-

750372A: Evolution and systematics of organisms, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Marko Mutanen, Annamari Markkola, Jari-Heikki Oksanen

Opintokohteen kielet: Finnish

Leikkaavuudet:

750307A Evolution and systematics of organisms 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 2nd autumn.

Learning outcomes:

Students will learn a general picture of the diversity of life-forms as to understand the evolutionary history of organisms.

Contents:

The course provides an insight into the biological evolution and evolutionary processes reflected by the systematic classification of the organisms. Also basic principles and concepts of systematics and classification are presented.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

30 h lectures.

Target group:

Compulsory to the biology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

Lectures give basic ability to different biology subjects.

Recommended or required reading:

Net material and supplementary reading: Bell, P.R. & Helmsley, A.R. 2000: Green Plants. Their origin and diversity. 2nd ed. Cambridge University Press., Willis, K.J. & McElwain, J.C. 2002: The evolution of plants. Oxford University Press. Hickman, C. P. et al. 2009. Animal Diversity, 5th edition, McGraw Hill New York.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Lecture exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Arja Kaitala, Prof. Jari Oksanen and Doc. Annamari Markkola.

Working life cooperation:

No.

Other information:

-

750336A: Evolutionary ecology, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Sami Kivelä

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / (English).

Timing:

B.Sc. degree 2nd autumn.

Learning outcomes:

To understand main principles of evolution and the concepts of natural selection, fitness and adaptation. Learn basics of life-history adaptation, speciation processes and social evolution.

Contents:

The aim of the course is to introduce a student with lectures and seminars to the main topics of evolutionary ecology, for example basic concepts of natural selection and evolution, selection level, speciation, evolution of life cycles, interactions between and within species are included. Review to the latest research results.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

36 h lectures and compulsory seminars, exam.

Target group:

BS and ECO compulsory, TEAeco optional.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Additional reading: Björklund, Mats 2009 Evoluutiobiologia. Gaudeamus, Sterans, S. and Hoekstra, R. F. 2005: Evolution, An Introduction. Oxford University Press, New York, 575 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Seminar and exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Arja Kaitala.

Working life cooperation:

No.

Other information:

-

755333A: Identification of animals, 6 op

Voimassaolo: 01.08.2016 - 31.07.2019

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Koivula

Opintokohteen kielet: Finnish

Leikkaavuudet:

755334A Identification of animals, vertebrates 4.0 op

ECTS Credits:

6 ECTS credits / 162 hours of work.

Language of instruction:

Finnish / English

Timing:

B.Sc. degree 1st autumn and spring.

Learning outcomes:

Main point of the course is to learn to identify Finnish animal species (vertebrate) and families (invertebrate) from museum samples. Basics of species' ecology and classification of organisms.

Contents:

During the autumn semester (9 h lectures in Finnish, 16 h exercises, exam), the Finnish vertebrate fauna is studied using stuffed museum samples. In the spring semester (9 h lectures in Finnish, 16 h exercises, exam) the invertebrate taxons (mostly family- or genus-level) common in Finland are studied using museum samples.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

18 h lectures in Finnish, 32 h exercises, independent studying, 2 exams.

Target group:

Biology students: compulsory.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

This course is needed for attending courses Field course in terrestrial animals (755322A) and Field course in aquatic animals (755321A).

Recommended or required reading:

Course handouts, Itämies J. ja Viro P. 1995: Eläinten lajintuntemus, selkärangattomat, 73 p.; Putaala, A., Marjakangas, A. & Rytönen, S. 2001: Eläinten lajintuntemus, selkärangaiset, 42 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Two species exams.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Kari Koivula.

Working life cooperation:

No.

Other information:

-

Compulsory

755333A-01: Basic identification of animals, vertebrate, 0 op

Voimassaolo: 01.08.2016 - 31.07.2019

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Pudas, Tuula Kaarina, Kari Koivula

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

755333A-02: Basic identification of animals, invertebrate, 0 op

Voimassaolo: 01.08.2016 - 31.07.2019

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Marko Mutanen

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

756342A: Identification of plant species, 3 - 4 op

Voimassaolo: 01.08.2015 - 31.07.2017

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Annamari Markkola

Opintokohteen kielet: Finnish

Leikkaavuudet:

756355A	Identification of plant species, brief	3.0 op
750303A	Nature conservation and land use	3.0 op

ECTS Credits:

3-4 ECTS credits / 80-107 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 1st autumn. ECOGEN 1st autumn.

Learning outcomes:

Student is able to identify most common boreal plant species in herbarium specimens.

Contents:

Demonstrations (16 h) and/or independent study of ca. 350 vascular plants, mosses and lichens in the boreal vegetation zone. 3 cr. without the literature in the exam and 2 cr. with the literature in the exam. In the identification exam student has to know specimens scientific name and family in latin.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Demonstrations (16 h) and/or independent study of ca. 350 vascular plants, mosses and lichens in the boreal vegetation zone. 4 cr without the literature in the exam and 3 cr with the literature in the exam. In the identification exam student has to know specimens scientific name and family in latin.

Target group:

4 cr compulsory to TEA and ECO; 3 cr compulsory to BS.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

Course is prerequisite for the Field course in ecological botany (756343A) and for the advanced plant species identification courses.

Recommended or required reading:

Laitinen et al. 2012: Field course in ecological botany; Hanhela, P. & Halonen, P. 1995: Plant identification; Huttunen, A: 1995: Introduction to forest types; Euroola, S., Hicks, S. and Kaakinen, H. 1994: Key to Finnish mire types, pp. 12-117 in: Moore, P. D. (ed.), 1994 European mires, London Academic Press, London, 367 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Species exam. 4 cr without the literature and 3 cr with the help of the literature.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Annamari Markkola.

Working life cooperation:

No.

Other information:

-

757312A: Molecular evolution, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kuittinen, Helmi Helena

Opintokohteen kielet: Finnish

Leikkaavuudet:

753327A Molecular evolution 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English. Lectures are in Finnish, but non-speakers can make an exam based on literature.

Timing:

B.Sc. 2nd autumn.

Learning outcomes:

After the course the student knows some basic methods that are used to study the history of living organisms and their evolutionary mechanisms. The student knows the main concepts in the field and can read scientific articles in molecular evolution.

Contents:

Basic methods of estimation of nucleotide substitution rates, building of phylogenetic trees with distance based methods and parsimony. Evolution of the genome structure and size. Scientific articles.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

24 h lectures, 16 h exercises/seminar, 40 h independent studies exam.

Target group:

Compulsory for biology students.

Prerequisites and co-requisites:

Concepts of genetics (757109P) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Additional reading Graur, D. and Li, W.-H. 1999: Fundamentals of Molecular Evolution. Sinauer, Massachusetts. The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Exam/home exam, homework, exercises.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Helmi Kuittinen.

Working life cooperation:

No.

Other information:

-

756346A: Plant biology lectures, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Anna-Maria Pirttilä, Häggman, Hely Margaretha

Opintokohteen kielet: Finnish

Leikkaavuudet:

752345A Basics of functional plant biology, lectures 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 2nd spring.

Learning outcomes:

The student can understand and explain the function and regulation of plant cells, tissues and entire plants.

Contents:

The most important phenomena of plant life, like photosynthesis, nitrogen metabolism and plant hormones are discussed.

Mode of delivery:

Face-to-face teaching, book exam.

Learning activities and teaching methods:

Lectures (20 h) and exams.

Target group:

Compulsory to the biology students.

Prerequisites and co-requisites:

Cell biology (750121P) or equivalent knowledge helps in following this course. This course is a prerequisite for course Plant biology practicals (756341A) and Advanced course in plant biology (752682S).

Recommended optional programme components:

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Recommended or required reading:

Taiz, L. et al. 2015. Plant Physiology and Development. Sixth Edition. 761 p. Sinauer Associates, Inc. ISBN-9781605352558.

Terävä, E. & Kanervo, E. 2008: Kasvianatomia or equivalent.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Lectures, book, exams.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Hely Häggman and Doc. Anna Maria Pirttilä.

Working life cooperation:

No.

Other information:

-

756353A: Plant developmental biology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Häggman, Hely Margaretha

Opintokohteen kielet: Finnish

Leikkaavuudet:

756332A Plant developmental biology 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 3rd spring.

Learning outcomes:

The student has a comprehensive view on plant development and show knowledge of the recent methods used in the research of plant developmental biology.

Contents:

Modern methods in plant biology and especially the mutant or genetically modified plants have been in a key role to understand factors, mechanisms and regulation affecting plant development. The lectures include cell level

information (cell division, growth and differentiation), embryo development, meristem formation and maintenance, organ development and cell death as a role of normal plant development. Moreover, the role of environmental factors in plant development will be covered.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Developmental biology 20 h lectures, home essay / seminar and final exam.

Target group:

Compulsory to BS and ECO, TEA: optional.

Prerequisites and co-requisites:

Basics of plant biology (756346A) is recommended as prerequisite.

Recommended optional programme components:

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Recommended or required reading:

Lectures and supplementary material. Timmermans, M.C.P.: Plant Development. 2010. Elsevier.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Hely Häggman.

Working life cooperation:

No.

Other information:

-

756351A: Basics in population ecology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kvist, Laura Irmeli, Orell, Markku Ilmari

Opintokohteen kielet: Finnish

Leikkaavuudet:

755336A Population ecology 10.0 op

756323A Population biology of plants 5.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 3rd autumn.

Learning outcomes:

Basic skills in methods of population biology.

Contents:

Demography and life history strategies with emphasis on dynamics of structured populations in space and time, with an emphasis on conservation biology. Usage of matrix models to calculate basic population parameters and analyze population viability. Metapopulation dynamics and ecological and evolutionary genetics and interactions between populations and their environment are addressed. In exercises, dynamics of populations are analysed with matrix models and simulation programs.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

32 h lectures, 18 h computer exercises, seminar.

Target group:

ECO: compulsory.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Silvertown & Charlesworth 2001: Introduction to Plant Population Biology (4 th edition), Blackwell Science.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Exam.

Grading:

1-5 / Fail.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Person responsible:

Doc. Laura Kvist

Working life cooperation:

No.

Other information:

-

750374A: Evolution, systematics and morphology of organisms, 3 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Annamari Markkola, Sami Kivelä

Opintokohteen kielet: Finnish

Leikkaavuudet:

755312A Evolution, systematics and morphology of animals, practicals 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. degree 2. autumn.

Learning outcomes:

Main aim of the course is to learn evolutionary history of organisms and basics of systematics: how the life has evolved and which evolutionary processes have affected the development. Students will get an idea, how and why different or similar morphological traits and functions have evolved in different taxonomic groups.

Contents:

Morphology and anatomy of macro- and microscopic specimens of different taxonomic groups are studied by the students in systematic order from microbes to plants and invertebrate and vertebrate animals. Demonstrations connect the morphological traits of studied specimens and organism groups to a wider evolutionary context and illustrate the importance of different structures for the organisms in their living environment.

Mode of delivery:

Face-to face teaching.

Learning activities and teaching methods:

36 h compulsory exercises and demonstrations, exercise exam.

Target group:

BSc, ECO and BS: compulsory, TEA: optional.

Prerequisites and co-requisites:

Evolution and systematics of organisms (750372A).

Recommended optional programme components:

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Recommended or required reading:

Course handouts can be bought from the teachers before the course starts. Net material and books Bell, P.R. & Hemsley, A.R. 2000. Green plants. Their origin and diversity. 2 nd edn. Cambridge University Press. Willis, K.J. &

McElwain, J.C. 2002: The evolution of plants. Oxford University Press. Rikkinen, J. 1999: Leviä, sieniä ja leväsieniä, johdatus levien ja sienten monimuotoisuuteen. Yliopistopaino, Helsinki. 194 s. Hickman, C, P. et al. 2009. Animal Diversity, 5. painos, McGraw Hill New York.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Annamari Markkola.

Working life cooperation:

No

Other information:

-

755321A: Field course in aquatic animals, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Muotka, Timo Tapani, Kaisa-Leena Huttunen

Opintokohteen kielet: Finnish

Leikkaavuudet:

751307A Field course in aquatic animals 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 1st summer. ECOGEN 1st summer.

Learning outcomes:

To learn basic methods in biological freshwater sampling and to identify the most common freshwater taxa.

Contents:

Basics of freshwater ecology. Demonstrations of the most frequently-used biological sampling methods. Identification of the most common freshwater fishes, invertebrates and zooplankton.

Mode of delivery:

Face-to-face teaching and independent studying.

Learning activities and teaching methods:

Summer: 50 h of field work and demonstrations at the Oulanka research station, 83 h of independent studying including a reading package.

Target group:

Compulsory (5 cr) to ECO. TEAeco: either Field course in aquatic animals 5 cr (755321A) or Field course in terrestrial animals 5 cr (755322A) is compulsory for biology major, the other field course can be included to the ecology minor. TEAbs, alternatively compulsory to TEAbs either Field course in aquatic animals 5 cr or Field course in terrestrial animals 5 cr. TEA: at least 10 cr compulsory, two field courses, one animal and other botany field course (756343A).

Prerequisites and co-requisites:

Basic identification of animals (755333A) or equivalent knowledge (if necessary, selection to the course 755321A can be based on success in course 755333A).

Recommended optional programme components:

This course is a prerequisite for the following: Winter ecology and physiology (750377A), Special course in aquatic invertebrates (754627S), Assessment and monitoring of the ecological status of water bodies (754625S), Field methods in freshwater biomonitoring (754626S).

Recommended or required reading:

Reading package, handouts and lectures given before / during the course.

Assessment methods and criteria:

On the final course day species identification exam on the species met during the course, practical exam on the sampling methods and theoretical exam based on the literature and demonstration material.
Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Timo Muotka.

Working life cooperation:

No.

Other information:

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756343A: Field course in ecological botany, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Annamari Markkola

Opintokohteen kielet: Finnish

Leikkaavuudet:

752304A Field course in ecological botany 5.0 op

ECTS Credits:

5 cr / 133 h of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 1st summer. ECOGEN 1st summer.

Learning outcomes:

Student is able to identify most common boreal plant species in the field, to plan and conduct ecological field experiments and use basic methods in vegetation analyses.

Contents:

Vegetation in the coast of Bothnian Bay in Hailuoto and/or Oulu (3 days). Basics of boreal forest and mire vegetation classification and types at Oulanka Research Station (7 days). Vegetation research and basic methods of stock estimation. Mire vegetation development and ecological biodiversity.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures 10 h, field demonstrations and laboratory exercises, excursions 84 hours in Oulu and/or Hailuoto and Oulanka Research Station. Field exams for plant identification and mire ecology, report.

Target group:

B.Sc. Compulsory to ECO 5 cr and TEA 5 cp, TEA: at least 10 cr compulsory, two field courses, one ecological botany field course (756343A) and other animal field course (either 755321 or 755322A).

Prerequisites and co-requisites:

Identification of plant species (756354A) 5 cr or equivalent knowledge.

Recommended optional programme components:

Course has capacity for 32 or 40 students. Possible elimination of the candidates is done by study success and Plant identification (756354A) grade. This course is a prerequisite for courses Plant ecology (752600S), Mire ecology (752692S) and Field course in Arctic-Alpine ecology and vegetation (752642S).

Recommended or required reading:

Laitinen et al. 2012: Field course in ecological botany; Hanhela, P. & Halonen, P. 1995: Plant identification; Huttunen, A: 1995: Introduction to forest types; Eurola, S., Hicks, S. and Kaakinen, H. 1994: Key to Finnish mire types, pp. 12-117 in: Moore, P. D. (ed.), 1994 European mires, London Academic Press, London, 367 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Field exams, report.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

doc. Annamari Markkola.

Working life cooperation:

Essential working life skills are learned during the field course.

Other information:

-

755322A: Field course in terrestrial animals, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Seppo Rytkönen

Opintokohteen kielet: Finnish

Leikkaavuudet:

751306A Field course in terrestrial animals 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. - 1st summer. ECOGEN 1st summer.

Learning outcomes:

The aim of the course is to learn the basics of field identification and ecology of terrestrial animals in northern Finland. The student will understand that proper skills in species identification and knowledge of species' ecology are the basis of ecological research.

Contents:

The fauna in different kinds of terrestrial habitats is studied using several ecological sampling and research methods. The course is held at the Oulanka Research Station, Kuusamo, and deals with identification and ecology of invertebrates, mammals (especially small mammals), gallinaceous birds and birds of prey. The exercises take place partly in the field and partly in the laboratory. Data gained during the course is analyzed. The results are reported (in PowerPoint) and presented in the final seminar in Kuusamo.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Part 1. (Oulu): 2 h demonstration, independent studying. Part 2. (Oulanka): 49 h demonstrations and practicals, one species and theory exam, seminar.

Target group:

Compulsory (5 cr) to ECO. TEAeco: either Field course in aquatic animals 5 cr (755321A) or Field course in terrestrial animals 5 cr (755322A) is compulsory for biology major, the other field course can be included to the ecology minor. TEAbs, alternatively compulsory to TEAbs either Field course in aquatic animals 5 cr or Field course in terrestrial animals 5 cr. TEA: at least 10 cr compulsory, two field courses, one animal and other botany field course (756343A).

Prerequisites and co-requisites:

Basic identification of animals (755333A) or equivalent knowledge.

Recommended optional programme components:

This course is a prerequisite to course Winter ecology and physiology (750377A).

Recommended or required reading:

Compulsory at Oulanka: 1) Rytkönen, S. ym. 2003: 751306 Maaeläimistön tuntemus ja ekologia. - Biologian laitoksen monisteita 3/2003. Oulun yliopisto, Oulu. 2) Pentinsaari, M. ym. 2015: Eläinten lajintuntemus, selkärangattomat. Oulun yliopisto, Oulu. Insect book recommended: Chinery, M. 1988 Pohjois-Euroopan hyönteisheimojen määrittäysopas, Tammi, Helsinki, 2. painos.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Theory exam, species identification exam, seminar presentation.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Seppo Rytönen.

Working life cooperation:

No.

Other information:

Binoculars, bird identification book, suitable outfit. Preparation knife, preparation scissors and sharp cusp tweezers.

755325A: Methods in ecology I, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Koivula

Opintokohteen kielet: Finnish

Leikkaavuudet:

750347A Ecological methods I 6.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 3rd autumn, ECOGEN 1st autumn.

Learning outcomes:

Students are familiar to scientific method and can separate scientific information from other contents of culture.

Students have learned to assess the uncertainty of information and can evaluate the quality of information with respect to its applied value. Students also learn to build a valid theoretical or empirical strategy to solve scientific problems.

Contents:

The aim of the course is to introduce the students in scientific modes of argumentation and research methods in modern ecology. Both the empirical and theoretical methods and their relationship in theory formation are discussed. Hypothesis testing; observational method, experimental method and comparative method are the empirical methods introduced. Autumn period ends in a seminar where scientific publications are analysed.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures, seminar, exercises and exam.

Target group:

Compulsory to ECO.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Kari Koivula, Doc. Seppo Rytkönen and Prof. Markku Orell.

Working life cooperation:

No.

Other information:

-

755329A: Methods in ecology II, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Seppo Rytkönen, Jari-Heikki Oksanen

Opintokohteen kielet: Finnish

Leikkaavuudet:

750647S Methods in ecology II 7.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Lectures Finnish / English, exercises also in English.

Timing:

Finnish B.Sc. 3rd spring, ECOGEN ECO 1st spring.

Learning outcomes:

The aim of the course is to learn in practice how to apply scientific method in ecological research. The student learns how to select appropriate methods for different ecological problems, and a toolkit for study design and data analysis.

Contents:

Continuation to course Ecological methods I 5cr (755325A, 755625S). This course focuses on applying the scientific method in ecological research. The course consists mainly of computer exercises in the following subjects: sampling, sample size determination, experimental design and statistical analysis esp. analysis of variance, comparative methods (independent contrasts - analysis), multivariate methods (cluster analysis, ordination) and meta-analysis. Also other current issues can be included.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures 8 h, 40 h exercises, independent work and exam.

Target group:

ECOGEN ECO compulsory.

Prerequisites and co-requisites:

Course Ecological methods I 5 cr (755325A). Recommended: Introduction to Statistics 5 cr (806118P) and A second course in statistics 5 cr (806119P).

Recommended optional programme components:

-

Recommended or required reading:

Reading package at course wiki-pages.

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Seppo Rytkönen and Prof. Jari Oksanen.

Working life cooperation:

No.

Other information:

-

756344A: Plant ecology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Taulavuori, Annamari Markkola

Opintokohteen kielet: Finnish

Leikkaavuudet:

752300A Plant ecology 7.0 op

ECTS Credits:

5 cr / 133 hours of work.

Language of instruction:

Lectures Finnish, Exercises Finnish / English.

Timing:

B.Sc. 2nd autumn. ECOGEN 1st autumn.

Learning outcomes:

Student will get basic knowledge how plants adapt to different environmental factors.

Contents:

The main subject of this course is the heterogeneity of environment and the capacity of plants to adapt flexibly to different light and nutrient conditions. For carbon economy the main questions are variation in photosynthetic potential, extrinsic factors which restrict the photosynthesis and the structural and physiological adaptations to different light conditions. Nutrient economy is not only dependent on the soil of the habitat but also on the capacity of plant to change the ions from the surface of soil particles. Symbiosis has a great importance on nutrient economy of boreal plants. The balance between benefits and costs defines whether the symbiosis with the nitrogen fixation bacteria or with mycorrhizal fungi is beneficial for the plant or not. There is competition between plants for soil nutrients and for light. How is it possible that plants competing for the same basic nutrients can live in the same habitat? Isn't the niche theory valid for plants?

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

(1) 24 h lectures and exam; (2) 10 h seminars on the literature of plant ecology; (3) 30 h demonstrations and exercises in field and laboratory (basic methods in plant ecology and laboratory work) and 4 h final seminars. International students will compensate lectures by reading book Ridge, I. 2002: Plants, Oxford Univ. Press.

Target group:

Compulsory to ECO.

Prerequisites and co-requisites:

Basics of ecology (750124P) and Field course in ecological botany (756343A) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Ridge, I. 2002: Plants.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Lecture exam, laboratory diary and seminar presentation.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Kari Taulavuori ja doc. Annamari Markkola (lectures), Kari Taulavuori (exercises).

Working life cooperation:

No.

Other information:

-

751366A: Animal behaviour, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kaitala Arja

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 3rd spring or M.Sc. 1st spring ECOz.

Learning outcomes:

To understand basic principles of animal behaviour in an evolutionary ecology context.

Contents:

The basics of behavioural ecology of animals. Lecture topics: Animal foraging, predator-prey interactions, mating systems, and social behaviour. Seminars are based on the latest research results.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

30 h lectures, seminars, exam.

Target group:

B.Sc. degree optional to ECO, M.Sc. degree compulsory to ECOz.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Davis, NB, Krebs, JR, & West, SA N.B. (2012) An Introduction to Behavioural Ecology, 4th ed, Wiley-Blackwell.

The availability of the literature can be checked from [this link](#)

Assessment methods and criteria:

Seminar and exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Arja Kaitala.

Working life cooperation:

No.

Other information:

-

756348A: Ecological responses to global change and air pollution in the subarctic, 5 - 8 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Taulavuori

Opintokohteen kielet: Finnish

Leikkaavuudet:

750343A Ecological responses to global change and air pollution in the subarctic 4.0 op

ECTS Credits:

5 (- 8) cr / 133 (- 240) hours of work.

Language of instruction:

Finnish / English.

Timing:

B. Sc. / M. Sc. / Ph.D. Field excursion is arranged if resources allow.

Learning outcomes:

Student can identify the ecological and environmental effects of climate change and air pollution in the subarctic area. In addition, the student may learn basic research methods related to topic, and how to use the facilities provided by the subarctic research stations in the research.

Contents:

Lectures deal the ecological responses of global change and air pollution. The content is focused on the environmental effects and their ecological significance in the northern areas. During excursion the student familiarizes with the special features of northern areas and explores the action and research carried out in the northern research stations.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

(1) 24 h lectures with exam, and 15 h independent studies (essay and seminar work) (4 cr); (2) 4-5 days summer excursion and closing seminar (3 cr); participation in excursion necessitates accepted credits in the first part (lectures, independent studies).

Target group:

Ecology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-ACIA (2005) Arctic Climate Impact Assessment, Cambridge University Press, 1042 p. -AMAP Assessment 2006: Acidifying Pollutants, Arctic Haze, and Acidification in the Arctic. Arctic Monitoring and Assessment Programme (AMAP), Oslo, Norway. Xii + 112pp. Bell JNB & Trehov M (eds.) 2002. Air pollution and plant life. Wiley. 2nd edition. 480 pages.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Lectures, essay and seminar, excursion, closing report and seminar.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail

Person responsible:

Doc. Kari Taulavuori.

Working life cooperation:

Possible excursion will include tours to the northern research stations.

Other information:

Field excursion is arranged if resources allow.

750349A: Examinations on optional topics in biology, 2 - 10 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

751354A	Examinations on optional topics	2.0 op
752352A	Examination in optional topics	2.0 op
753351A	Examinations on optional topics	2.0 op

ECTS Credits:

2-10 ECTS credits / 53-267 hours of work.

Language of instruction:

Depends on the book.

Timing:

B.Sc. degree 2.-3. year or M.Sc. degree 1.-2. year.

Learning outcomes:

Student independently concerns him/herself to special issues in animal physiology or animal ecology.

Contents:

Examinations on books, which are not compulsory in any other course unit.

Mode of delivery:

Face-to face teaching.

Learning activities and teaching methods:

Book exan in Examinarium.

Target group:

-

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Literature chosen in agreement with the responsible person.

Assessment methods and criteria:

Book exan in Examinarium.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail or Pass / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

-

Other information:

-

755313A: Field identification of birds, 1 - 5 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Seppo Rytkönen

Opintokohteen kielet: Finnish

ECTS Credits:

2 ECTS credits / 53 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 1 st summer.

Learning outcomes:

The aim of the course is to get a basic level of field identification of Finnish birds.

Contents:

The student will learn the basics of avian field identification by familiarizing him/herself with the local bird fauna in different biotopes. The method is self-learning with keeping a notebook of the field observations.

Learning activities and teaching methods:

Blended teaching.

Target group:

ECO optional.

Prerequisites and co-requisites:

Basic identification of animals (755333A) or equivalent knowledge.

Recommended optional programme components:

Optional addition to course Field course in terrestrial animals (755322A).

Recommended or required reading:

Additional information and material: wiki oulu.fi à Animal ecology à Teaching à Field identification of birds.

Assessment methods and criteria:

Notebook of field observations.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Accepted / Failed.

Person responsible:

Doc. Seppo Rytönen.

Working life cooperation:

No.

Other information:

-

755324A: Functional animal ecology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Seppo Rytönen

Opintokohteen kielet: Finnish

Leikkaavuudet:

751378A Functional animal ecology 6.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Lectures in Finnish, exercises in Finnish / English.

Timing:

B.Sc. 2nd spring or M.Sc. 1st spring. NNE.

Learning outcomes:

The aim of the course is to understand the relationship between morphology and function by the means of general ecomorphological model. The student will get both theoretical and practical basics for ecomorphological (and. general scientific) research procedures: scientific hypothesizing, sampling, data analysis and reporting and interpreting the results.

Contents:

The course focuses on the relationship between phenotype and function, especially the correlation between animal morphology and behaviour. The course consists of two parts: A) Lectures in Finnish. However, articles about each subject are available for foreign students, including ecomorphological models and correlations, measurement error, allometry, fluctuating asymmetry and phylogenetic analyses. B) Exercises consisting of miniature studies, field and laboratory work, and seminar. The results of the mini studies, in form of PowerPoint presentations, are presented in the seminar. Before the exercises, students write a home essay (or take an exam).

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

12 h lectures, 40 h exercises, seminar and essay (or exam).

Target group:

Recommended for ecology students.

Prerequisites and co-requisites:

Recommended Evolution, systematics and morphology of animals, practicals (750374A), Introduction to statistics 5 cr (806118P) and A second course in statistics 5 cr (806119P).

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Essay or exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Seppo Rytönen.

Working life cooperation:

No.

Other information:

-

754322A: Introduction to hydrobiology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Muotka, Timo Tapani

Opintokohteen kielet: Finnish

Leikkaavuudet:

754308A Introduction to hydrobiology 3.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 3rd spring, M.Sc. 1st spring. Even numbered years.

Learning outcomes:

Basic knowledge of inland water ecosystems structure, function and organisms. Basic concepts of hydrobiology which are necessary for further hydrobiology studies.

Contents:

Hydrography and physical and chemical properties of lakes and streams. Structure and ecological interactions of aquatic ecosystems (bacteria, plant and animal plankton, water insects, other invertebrates, fishes). Most important biological interactions (competition, predation, parasitism, mutualism), inland water food web structure and regulation. Biodiversity of inland waters. Human influence on inland water biodiversity and ecosystem functions.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

26 h lectures, final exam.

Target group:

ECO, TEA.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

Lectures are compulsory to the students taking the hydrobiology study package.

Recommended or required reading:

Course material and book Brönmark, C. & Hansson, L. 2005: The Biology of Lakes and Ponds. Oxford University Press, 285 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Timo Muotka.

Working life cooperation:

No.

Other information:

-

756304A: Plant ecophysiology in changing environments, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Taulavuori

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 3rd or M.Sc. 1st spring.

Learning outcomes:

After finishing the course student understands interactions between plant and environment, and has become acquainted to most important experimental methods in physiological plant ecology and student can apply research parameters. Student can apply the knowledge to plant production and environmental protection issues.

Contents:

The aim of the course is to initiate the students into the basics of plant ecophysiology in changing environments. The physical, chemical (abiotic) and biotic factors in the environment affects plant's growth and survival. Plant ecophysiology is an experimental science, which studies the physiological functions and adjustments underlining the ecological observations from the viewpoint of growth and survival. Different environmental stresses restrict the plant growth. Plant ecophysiology is experimental science which studies the physiological functions and regulation mechanisms on growth, survival, abundance and distribution. Effects of abiotic and biotic factors are studied. How elevated temperature, CO₂, drought stress, nutrient imbalance, air pollutants, metals, UV radiation and plant pathogens affect on plants' gas exchange, primary metabolism, carbon allocation and growth. The exercises can also focus on the effects of environmental factors on photosynthesis, respiration, transport of photosynthetic products, water economy, energy economy and nutrient economy. Special features of ecophysiology of boreal plants are also dealt with.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

20 h lectures and demonstrations, 35 h exercises, exam, report, seminar.

Target group:

ECOb, BSb, Ph.D. students (if not in the undergraduate degree).

Prerequisites and co-requisites:

-

Recommended optional programme components:

Course is related both to plant ecology and plant physiology basic studies.

Recommended or required reading:

Hans Lambers, F.Stuart Chapin III, Thijs L. Pons 2008: Plant Physiological Ecology. Springer Verlag. 540 s. Second edition.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Seminar and report.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Kari Taulavuori.

Working life cooperation:

No.

Other information:

-

750313A: Research training, 2 - 15 op

Opiskelumuoto: Intermediate Studies

Laji: Practical training

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

1-15 ECTS credits / 27-405 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. degree.

Learning outcomes:

Student applies the education given knowledge and skills in working life to gain hands-on experience.

Contents:

Work on special projects in the different biology research groups at the department or elsewhere or independent project work including field and/or laboratory work or work at the biological stations. The work is not included to other study modules in biology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

The topic and the study plan have to be agreed on in advance (registration form). The student has to keep diary and prepare a report on the work.

Target group:

-

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Report.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Prof. Markku Orell, Prof. Jari Oksanen, Prof. Outi Savolainen and Prof. Hely Häggman.

Working life cooperation:

Yes. Participating to biology project will give working life skills.

Other information:

-

755328A: Wildlife management and game animal ecology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Jouni Aspi, Kari Koivula

Opintokohteen kielet: Finnish

Leikkaavuudet:

751368A Wildlife management and game animal ecology 6.0 op

ECTS Credits:

5 cr / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 3rd autumn or M.Sc. 1st autumn.

Learning outcomes:

After carrying out the study module the student will be able to recognize special ecological traits of the game animals and relate them to the general ecological framework. The student will be also to appraise the basics of durable hunting of game animals. The student will be also able to appraise the basics of durable hunting of game animals and critically judge different wildlife management methods from the scientific starting point.

Contents:

The ecology of game species, their life histories, population dynamics and predator-prey relationships. Hunting ecology: man as predator, management and hunting of the game species. The impact of forestry on the game species' populations. Students are also introduced to wildlife management in practice and to the social aspect of wildlife-human relationship.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

24 h lectures, one-day excursion to a game breeding area, seminar with written reports and exam.

Target group:

-

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Seminar with report and exam.

Grading:

1-5 / Fail.

Person responsible:

Prof. Jouni Aspi ja doc. Kari Koivula.

Working life cooperation:

Yes.

Other information:

-

750377A: Winter ecology and physiology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Taulavuori

Opintokohteen kielet: Finnish

Leikkaavuudet:

750325A Winter ecology and physiology 3.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

English.

Timing:

B.Sc. 3 rd or M.Sc. 1 st spring. NNE.

Learning outcomes:

Student obtains basic knowledge of animal and plant acclimations and adaptations to winter, and can evaluate the effects of cold temperatures and snow on overwintering, and learns central methodology in winter ecology and physiology.

Contents:

Three independent units: 1) Winter ecology and physiology course (7 h lectures and 13 h laboratory practicals and 4 h seminar in Oulu, and 4 day long field excursion to the Oulanka Research Station (total about 50 h, 3 cr); 2) Book exam on a common exam day 2 cr: Marchand, P. J. 1996: Life in the cold. An introduction to winter ecology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures, exercises, report and seminar presentation.

Target group:

Biology students.

Prerequisites and co-requisites:

Courses Basics of ecology (750124P), Field course in ecological botany (752304A), Cell biology (750121P), Field course in terrestrial animals (751306A), Field course in aquatic animals (751307A) and Basics of functional plant biology, lectures (752345A) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Marchand, P. J. 1996: Life in the cold. An introduction to winter ecology. (3rd edition). University Press of New England. 304 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Seminar presentation and book exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Course + seminar: Pass / Fail, book exam: 1-5 / Fail.

Person responsible:

Doc. Kari Taulavuori.

Working life cooperation:

No.

Other information:

-

750380A: Working knowledge, 1 - 5 op

Voimassaolo: 01.08.2016 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

1-5 ECTS credit / 27-133 hours of work

Language of instruction:

Finnish /English.

Timing:

B.Sc. 1st spring-3rd spring.

Learning outcomes:

During the course student will get work experience and develop common working life skills as communication and organization skills and get to know work community and it's dynamics.

Contents:

Independent work for example in the summer job.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Student will keep diary of her/his tasks and hours which will be added to the report that the student will do. Report includes self assesment.

Target group:

B.Sc. students.

Prerequisites and co-requisites:

-

Recommended optional programme components:

Before Practical training (750615S).

Recommended or required reading:

-

Assessment methods and criteria:

Report and diary.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

Yes. Training in suitable tasks will develop student's working life skills.

Other information:

-

902002Y: English 1 (Reading for Academic Purposes), 2 op

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Proficiency level:

B2/C1 on the [Common European Framework of Reference](#) scale.

Status:

This course is mandatory for students of the following degree programmes:

Faculty of Science

- Biology
- Chemistry
- Mathematical Sciences
- Physics

Oulu Mining School

- Geosciences degree programme

Faculty of Information Technology and Electrical Engineering

- Department of Information Processing Science

Students in the Department of Geography take English 3.

Engineering students in the following programmes take their English courses in the Faculty of Technology:

Oulu Mining School:

- Mining Technology and Mineral Processing degree programme

Faculty of Information Technology and Electrical Engineering

- Department of Electrical Engineering
- Department of Communications Engineering
- Department of Computer Science and Engineering

Please consult the Faculty Study Guide to establish the language requirements for your own degree program.

Required proficiency level:

English must have been the A1 or A2 language at school or equivalent English skills should have been acquired otherwise.

ECTS Credits:

2 ECTS credits (total work load 54 hours including classroom meetings.)

Language of instruction:

English

Timing:

Biology: 1st year spring term

Chemistry: 1st year autumn term

Geology: 1st year spring term

Information Processing Science: 1st year spring term

Mathematical Sciences (pedagogy): 1st year spring term

Mathematical Sciences: 2nd year autumn term

Physical Sciences: 1st year autumn term

Learning outcomes:

By the end of the course, you are expected to be able to

- have acquired effective vocabulary learning techniques
- be able to distinguish parts of words to infer meanings
- utilize your knowledge of text structure and cohesion markers to understand academic texts
- extract information and learn content from English readings in scientific and professional contexts

Contents:

The course will focus on reading strategies; these include recognizing how texts are organized, identifying key points in a text, and understanding words in context. Vocabulary work in the course will focus on a) academic vocabulary, as used in formal scientific writing, and b) using your knowledge of the meanings of parts of words (affixes) to infer meaning.

Mode of delivery:

Contact teaching

Learning activities and teaching methods:

The scope of the course is 2 op (54 hours student workload).

Target group:

1st year students of Biology, Chemistry, Geology, Information Processing Science, Physics, and Mathematics (pedagogy); 2nd year students of Mathematics

Prerequisites and co-requisites:

-

Recommended optional programme components:

Students are also required to take 902004Y Scientific Communication, which is taken AFTER completion of this course.

Recommended or required reading:

Photocopies will be provided by the teacher and/or required texts will be accessible online or from the university library.

Assessment methods and criteria:

Student work is monitored by continuous assessment. You are required to participate regularly and actively in all contact teaching provided, and successfully complete all required coursework. There will be three monthly tests on material covered so far.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass/Fail

Person responsible:

Karen Niskanen

Working life cooperation:

-

Other information:

N.B. Students with grades *laudatur* or *eximia* in their A1 English school-leaving examination can be exempted from this course and will be granted the credits by the Faculty of Science.

902004Y: English 2 (Scientific Communication), 2 op

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Leikkaavuudet:

ay902004Y English 2 (Scientific Communication) (OPEN UNI) 2.0 op

Proficiency level:

B2/C1 on the CEFR scales

Status:

This course is mandatory for all 2nd year students (except **geographers**) who will have English as their foreign language in their B.Sc. degree. This includes the students who were exempted from 'Reading for Academic Purposes'(902002Y). Please consult the faculty study guide to establish the language requirements on your own degree programme.

Required proficiency level:

Students taking this course must have had English as the A1 or A2 language at school or the equivalent English skills should have been acquired otherwise. The course 'Reading for Academic Purposes' (902002Y) is a pre-requisite, unless exempted.

ECTS Credits:

The student workload is 53 hrs work/ 2 ECTS credits.

Language of instruction:

English

Timing:

Biology: 2nd year autumn term

Chemistry: 2nd year spring term

Geology: 2nd year spring term

Information Processing Science : 2nd year autumn term

Mathematics: 2nd year spring term

Physics: 2nd year autumn term

Learning outcomes:

By the end of the course, you are expected:

1. to have demonstrated your use of appropriate strategies and techniques for communicating effectively in English in an academic context.
2. to have demonstrated the ability to prepare and present scientific subjects to your classmates, using appropriate field-related vocabulary.

Contents:

Skills in listening, speaking, and presenting academic topics are practised in the classroom, where there is an emphasis on working in pairs and small groups. Homework tasks include online lecture listening and reading, preparation for classroom discussions and written work to support the classroom learning.

Mode of delivery:

Contact teaching

Learning activities and teaching methods:

Contact teaching 28 hours, homework 28 hours

Target group:

2nd year students of Biology, Chemistry, Geology, Information Processing Science, Mathematics, Physics

Prerequisites and co-requisites:

-

Recommended optional programme components:

Also required: [902002Y Reading for Academic Purposes Englannin kieli 1](#)

Recommended or required reading:

Course materials will be provided by the teacher.

Assessment methods and criteria:

Continuous assessment is based on regular attendance, active participation in all lessons and the successful completion of all homework tasks.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / fail.

Person responsible:

Karen Niskanen

Working life cooperation:

-

Other information:

-

750031Y: Orientation course for new students, 1 op

Voimassaolo: - 31.07.2017

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Vanhatalo, Minna-Liisa

Opintokohteen kielet: Finnish

Leikkaavuudet:

750032Y Orientation course for new students 2.0 op

ECTS Credits:

1 ECTS credit / 27 hours of work

Language of instruction:

Finnish.

Timing:

B.Sc. 1st autumn - spring.

Learning outcomes:

The aim of the course is to introduce new biology students to the university, academic studies, the department and the studies of biology, give knowledge of the social relevance of the degree programme and student is able to set own goals for the studies.

Contents:

Students orientate themselves with the help of group meetings, presentations and seminar to the academic studies. During the course students make their first personal study plan (HOPS) for the first study year.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Tutorials, presentations and seminar of major subjects, independent studying, total 30 h.

Target group:

Compulsory to the biology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Study guide.

Assessment methods and criteria:

Participation to the tutorials, presentations, seminar and doing the personal study plan for the first year.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Ph.Lic. Minna Vanhatalo.

Working life cooperation:

No.

Other information:

-

901035Y: Second Official Language (Swedish), Oral Skills, 1 op

Voimassaolo: 01.08.2014 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Opintokohteen kielet: Swedish

Leikkaavuudet:

901061Y Second Official Language (Swedish), Oral Skills 1.0 op

ay901035Y Second Official Language (Swedish), Oral Skills (OPEN UNI) 1.0 op

901004Y Swedish 2.0 op

901034Y: Second Official Language (Swedish), Written Skills, 1 op

Voimassaolo: 01.08.2014 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Opintokohteen kielet: Swedish

Leikkaavuudet:

901060Y Second Official Language (Swedish), Written Skills 1.0 op
 ay901034Y Second Official Language (Swedish), Written Skills (OPEN UNI) 1.0 op
 901004Y Swedish 2.0 op

300003Y: Activities in university and student organizations, 1 - 4 op

Voimassaolo: 01.01.2010 -

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Faculty of Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

Ei opintojaksokuvauksia.

750033Y: Tutorial for new students, 1 op

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Vanhatalo, Minna-Liisa

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

1 ECTS credit / 27 hours of work

Language of instruction:

Finnish.

Timing:

B.Sc. 3rd autumn / M.Sc. 1st autumn.

Learning outcomes:

Course develops students' skills to guide, make presentations, work in group and organize. It also advances planning, arrangement and guidance abilities as well as responsibility.

Contents:

The student guides a group of new students during the orientation course introducing them to the university, academic learning environment, the department, curriculum and other students with the help of small group meetings and presentations.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Tutorials and presentations. Minimum 15 hours. In addition independent work includes the preparation of the tutorials.

Target group:

Second and third year biology students.

Prerequisites and co-requisites:

Course 750031Y.

Recommended optional programme components:

-

Recommended or required reading:

Study guide and training material.

Assessment methods and criteria:

Tutoring report.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Ph.Lic. Minna Vanhatalo.

Working life cooperation:

No.

Other information:

-

806119P: A Second Course in Statistics, 5 op**Voimassaolo:** 01.06.2015 -**Opiskelumuoto:** Basic Studies**Laji:** Course**Vastuuyksikkö:** Field of Mathematics**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Jari Pääkkilä**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

806113P	Introduction to Statistics A	5.0 op
806109P	Basic Methods in Statistics I	9.0 op

ECTS Credits:

5 ECTS credits

Language of instruction:

Finnish

Timing:

4th period

Learning outcomes:

Upon completion of the course, student will be able to

- analyze continuous and categorical response in the most common experimental and observational studies
- critically evaluate scientific articles
- implement and interpret analyses of a statistical software concerning issues of the course.

Contents:

- Skills for performing statistical analyses and inferences on the basis of data obtained in common experimental and observational studies are expanded and deepened
- statistical literacy of scientific articles with quantitative methods

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Total 50 h face-to-face teaching including lectures and exercise (partly computer exercises). Independent work 83 h.

Target group:

Minor students

Prerequisites and co-requisites:

The recommended prerequisite prior to enrolling for the course is the completion of the course: 806118P Introduction to Statistics or 806116P Statistics for Economic Sciences.

Recommended optional programme components:

After the course, student is able to continue other statistics courses.

Recommended or required reading:

Lecture notes

Assessment methods and criteria:

Mid-term exams and/or final exam and possible homework.

Grading:

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

Person responsible:

Jari Pääkkilä

Working life cooperation:

No

Other information:

-

780120P: Basic Principles in Chemistry, 5 op

Voimassaolo: 01.08.2016 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

780117P General and Inorganic Chemistry A 5.0 op

780109P Basic Principles in Chemistry 4.0 op

ECTS Credits:

5 credits/134 hours of work

Language of instruction:

Finnish

Timing:

1st autumn

Learning outcomes:

Upon completion of the course, the student will be able to display an understanding of basic chemistry phenomenon; equilibrium of acids and bases, chemical equilibrium, redox reactions and stoichiometry.

Contents:

Introduction to chemistry, stoichiometry, redox reactions, chemical equilibrium, the equilibrium of acid and bases, buffer solutions, titration, thermodynamics.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

40 hours of lectures and 94 hours of self-study

Target group:

Biology, Geology, Process Engineering, Environmental Engineering compulsory. Geography, optional.

Prerequisites and co-requisites:

The compulsory course in upper secondary school chemistry (1st course)

Recommended optional programme components:

The course is not included in the 25 ECTS credits entity of chemistry!

Recommended or required reading:

Tro, N.J., Principles of Chemistry. A Molecular Approach, Pearson, 3. edition, 2016

Assessment methods and criteria:

Final examination. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.

Person responsible:

Lecturer Minna Tiainen

Working life cooperation:

No

Other information:

No

030005P: Information Skills, 1 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Technology

Arvostelu: 1 - 5, pass, fail

Opettajat: Sassali, Jani Henrik, Ursula Heinikoski

Opintokohteen kielet: Finnish

Leikkaavuudet:

030004P Introduction to Information Retrieval 0.0 op

ECTS Credits:

1 ECTS credit

Language of instruction:

Finnish

Timing:

2nd or 3rd year

Learning outcomes:

Students know the different phases of information retrieval process and basic techniques of scientific information retrieval. They will find the most important reference databases of their discipline and know how to evaluate information sources and retrieval results.

Contents:

Retrieval of scientific information, the retrieval process, key databases of the discipline, and evaluation of information retrieval and information sources.

Mode of delivery:

Blended teaching: classroom training, web-based learning material and exercises in Optima environment, a final assignment on a topic of the student's own choice

Learning activities and teaching methods:

Training sessions 8h, group working 7h, self-study 12h

Target group:

Compulsory for all students of the Faculty of Technology, the Faculty of Information Technology and Electrical Engineering and the Faculty of Architecture. In the Faculty of Science compulsory for students of biology, physics, geosciences, chemistry and geography. Optional for students of biochemistry and mathematics.

Prerequisites and co-requisites:

-

Recommended optional programme components:

-

Recommended or required reading:

Web learning material <https://wiki oulu.fi/display/030005P>.

Assessment methods and criteria:

Passing the course requires participation in the training sessions and successful completion of the course assignments.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

pass/fail

Person responsible:

Science and Technology Library Tellus, tellustieto (at) oulu.fi

Working life cooperation:

-

Other information:

-

806118P: Introduction to Statistics, 5 op

Voimassaolo: 01.06.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opettajat: Jari Pääkkilä

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay806118P Introduction to Statistics (OPEN UNI) 5.0 op

806113P Introduction to Statistics A 5.0 op

ECTS Credits:

5 ECTS credits

Language of instruction:

Finnish

Timing:

3rd period

Learning outcomes:

After completing the course, student will be able to

- consider issues influencing to data collection
- describe data by appropriate methods (tables, statistics and graphical presentations)
- evaluate the effect size of the sample to the margin of error for instance in Gallup polls and in different market researches
- interpret output of a statistical software.

Contents:

- collecting data, e.g. sampling
- variables and measuring
- descriptive statistical methods and their selection
- margin of error of estimator for population mean and proportion
- statistical literacy
- basic analysis of data using statistical software

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Total 50 h face-to-face teaching including lectures and exercise (partly computer exercises). Independent work 83 h.

Target group:

Minor students

Recommended optional programme components:

After the course, student is able to continue other statistics courses.

Recommended or required reading:

Lecture notes

Assessment methods and criteria:

Mid-term exams and/or final exam and possible homework.

Grading:

Fail, 1-5

Person responsible:

Jari Pääkkilä

Working life cooperation:

No

Other information:

-

750124P: Basics of ecology, 5 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Jari-Heikki Oksanen, Orell, Markku Ilmari

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 1st spring.

Learning outcomes:

After completion of the course both biology and minor studies students understand better function of nature and the ecological phenomena in individual, population, community and ecosystem level.

Contents:

The course gives a student a basic idea about ecological interactions in individual-, population-, community- and ecosystem levels. In individual level the focus is on environmental demands of plants and animals. In population level the birth- and death rate of age groups and their effect on population growth is focused. In interactions between different species the emphasis is on how the competition between species leads to differentiation of niches. Predation is viewed as the regulatory effect on the population dynamics of prey populations. In community level the biodiversity and the patterns of succession are the main questions. In ecosystem level the emphasis is on energy flows and nutrient cycling. Evolution and adaptation are important in different fields of ecology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

The course is divided into three parts which follow the course book Krebs, C. J. 2009: Ecology (6th edition). 1st part: 24 hours of lectures based mainly on parts 1-2 of the course book. 2nd part: 24 hours of lectures are based on part 3 of the course book. 3rd part: students read the part 4 from the course book. In the course exam, there will be three questions, one from each part and all the questions have to be passed.

Target group:

Compulsory biology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Krebs, C. J. 2009: Ecology (6th edition). Part I.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Markku Orell and Prof. Jari Oksanen.

Working life cooperation:

No.

Other information:

-

750121P: Cell biology, 5 op

Voimassaolo: - 31.07.2020

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Häggman, Hely Margaretha, Henrika Honkanen, Kuittinen, Helmi Helena, Jaana Jurvansuu

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 1st autumn.

Learning outcomes:

The student is familiar with cellular structure and functioning in plant and animal cells, understands the social structures in multicellular species and knows why and how the genetic organizations (in nucleus, chloroplast and mitochondria) are co-operating, maintaining and regulating the cellular metabolism. Student understands the common origin and evolution of life on planet Earth, and understands the material basis and mechanisms of this continuity.

Contents:

During the recent years especially the development of molecular and microscopic and imaging techniques has increased our knowledge on cells and their social interactions. The structural and functional characteristics of plant and animal cells will be covered as well as the genetic organization maintaining and regulating the system.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

50 h lectures, three exams (zoology, plant biology, genetics). Home essays and internet material.

Target group:

Compulsory to the biology and biochemistry students.

Prerequisites and co-requisites:

Good basics in biology from elementary school.

Recommended optional programme components:

Cell biology is prerequisite for the following courses: Developmental biology-histology (755320A), Animal physiology (755323A), Plant biology lectures (756346A), Concepts of genetics (757109P). Course also gives readiness for studies in molecular biology and biochemistry.

Recommended or required reading:

Suitable parts of Campbell et al. 2014: Biology: a global approach (10e), Pearson, 1350 s. 978-1-292-00865-3, Alberts, B. et al. 2014: Molecular Biology of the Cell (6e), Garland Science Publishing, London, 1464 s. ISBN: 9780815345244 (or Lodish et al. 2012: Molecular Cell Biology (7e). Freeman, 973 s. ISBN-10: 1-4292-3413-X), Heino J. & Vuento M. 2014: Biokemian ja solubiologian perusteet (3. painos) WSOY Pro Oy, Helsinki, Jones R. et al. 2013: The molecular life of plants. Wiley-Blackwell, 742 s. ISBN : 978-0-470-87012-9.

The availability of the literature can be checked from [this link](#).

[\[HK1\]](#)linkkiä en osannut uudistaa

Assessment methods and criteria:

Three exams.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail. Final grade is average value of the three exams.

Person responsible:

Dr. Jaana Jurvansuu, Dr. Helmi Kuittinen and Prof. Hely Häggman.

Working life cooperation:

No.

Other information:

-

757109P: Concepts of genetics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Savolainen Outi

Opintokohteen kielet: Finnish

Leikkaavuudet:

757122P Concepts of genetics for biochemists 3.0 op

753124P Concepts of genetics 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 1 st spring.

Learning outcomes:

To understand and apply basic concepts of genetics, at Mendelian and molecular level.

Contents:

Part 1. Mendelian genetics, including the ideas of quantitative and population genetics. Part 2. Molecular genetics: replication, transcription, translation, genetic code, mutations, repair of DNA. Part 3. Selected topics on developmental genetics, and genetics of health and diseases.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

50 h lectures and seminars, 83 h independent studies, exam.

Target group:

Compulsory to the biology students (5 cr) Biochemistry students: parts 1 and 3 (3 cr) compulsory.

Prerequisites and co-requisites:

Cell biology (750121P) or equivalent knowledge.

Recommended optional programme components:

This course is prerequisite to all other genetics courses.

Recommended or required reading:

Materials are in Optima. Klug et al. 2012. Concepts of Genetics (10. ed). Pearson, 896 p. Alberts, B. et al. 2008: Molecular Biology of the Cell (5. ed). Garland Science Publishing, London, 1268 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Homeworks, home exams, lecture diary, exams.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

755323A: Animal physiology, 5 op

Voimassaolo: 01.08.2015 - 31.07.2020

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

751388A Animal physiology, lectures 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 2nd spring.

Learning outcomes:

After completing the course the student is able to form a general view of animal body functions, the regulation of organ systems, and the background of human health and diseases.

Contents:

Course focus on the basic problematic of physiological themes including nervous system, muscles, circulation, nutrition, metabolism, immune system, hormones and reproduction physiology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

50 h lectures and independent studying, mid-semester exams, home essays.

Target group:

Compulsory to the biology students.

Prerequisites and co-requisites:

Cell biology (750121P) or equivalent knowledge.

Recommended optional programme components:

This course is a prerequisite for the courses Animal physiology, exercises (755318A), Comparative animal physiology (751x84A/S) and Advanced course in animal physiology (751635S).

Recommended or required reading:

Reece, J.B. Urry, L.A. Cain, M.L., Wasserman, S.A. Minorsky, P.V. & Jackson R.B. 2011: Campbell Biology (9e). Pearson, Global Edition, 1309 p, handouts. The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Home essays and exam. Read more about [assessment criteria](#) at the University of Oulu webpage.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Esa Hohtola.

Working life cooperation:

No.

Other information:

-

750366A: Bachelor of Science final examination, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 3rd year.

Learning outcomes:

Student will understand basic methods, results and theories in ecology, physiology or genetics.

Contents:

Examinations on books related to B.Sc. thesis subject. List of books are presented on WebOodi. All the books are recommended to be done on the same exam in Examinarium.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Students make workshops where they discuss content of the books. Book exam (4 h). Exam is held in Examinarium.

Target group:

Compulsory to the biology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

BSz:

- Option 1: Randall etc.: Eckert's Animal Physiology, 5. ed., 2002 or newer, (chapter 4 onwards).
 - Option 2: Richard W. Hill, Gordon A. Wyse, and Margaret Anderson: Animal Physiology, 2. ed., Sinauer Press, 2008.
- Other books can be agreed on special reasons with prof. Esa Hohtola.

BSg

- Klug, W. S., Cummings, M. R., Spencer, C.A ja Palladino M.A.: Concepts of Genetics (11. ed.). Pearson & Prentice Hall, 2015
- Remember to mention the book edition to the teacher which book edition you read.
- responsible teacher dos. Helmi Kuittinen

BSb

- Option 1: Ridge, I. 2002. Plants. Oxford University Press, 344 p. ISBN 0-19-925548-2
- Option 2: Mauseth, J.D. 2009. An introduction to plant biology. 4th ed.
- Other books can be agreed on special reasons with prof. Hely Häggman.

ECOz

Exam book ensemble (5 cr.) is chosen from the following list:

- Bennett, P.M. & Owens, I.P.F. 2002. Evolutionary ecology of birds. Life histories, mating systems and extinction. – Oxford University Press. 206 p. (2 cr)
- Hanski, I. 2007. The Scinking world. (2 cr.)
- Davies, N.B. Krebs, J.R. & West, S.A. 2012. An introduction to behavioural ecology. – Blackwell, 441 p. (4 cr).
- Mayr, E. 1999. Biologia. Elämän tiede. – Art House, 327 p. (2 cr)
- Primack, R.B. 2012. A primer of conservation biology (4. ed). – 309 p. (2 cr).

- Smith, J.N.M., Keller, L.F., Marr, A.B. & Arcese, P. 2006. Conservation and biology of small populations. – Oxford University Press. 205 p. (2 cr)
- Other books can be agreed on special reasons with prof. Markku Orell

ECOb

- Larcher W. 2003. Physiological Plant Ecology 4th edition, 513 p.
- Ridge I. (Ed.) 2002. Plants. Oxford University Press, 345 p.
- Salonen V. 2006. Kasviekologia. 306 p., WSOY.
- Willis K.J. and McElwain J.C. 2002. The evolution of plants. 378 p. Oxford University Press.
- Scott Peter 2008. Physiology and Behaviour of Plants. Wiley, 305 p.
- Timonen, S & Valkonen, J. 2013. Sienten biologia. Gaudeamus, 448 p.
- Other books can be agreed on special reasons with prof. Jari Oksanen

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Exam in Examinarium.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

M.Sc. Henrika Honkanen, Prof. Hely Häggman, Prof. Jari Oksanen, doc. Helmi Kuittinen and Prof. Markku Orell.

Working life cooperation:

No.

Other information:

-

750332A: Bachelor of Science maturity exam, 0 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

0 ECTS credits / 2-4 hours of work.

Language of instruction:

Finnish / Swedish / English.

Timing:

B.Sc. degree.

Learning outcomes:

The student is well acquainted with the subject of the thesis and shows good first language skills.

Contents:

After completing the Bachelor of Science Thesis, the student writes an essay in his/her native language on the thesis, to show a good command of the language and the topic of the thesis. Maturity exam will be done in Examinarium.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Detailed instructions on Noppa. Four pages long essay exam. One teacher examine the maturity exam and Pro gradu working group accepts it. 4 h exam.

Target group:

Compulsory to the biology students. Exam is taken after completion of the thesis.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Four pages long essay. Done in Examinarium.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

750376A: Bachelor of Science seminar and thesis, 10 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

750396A Bachelor of Science seminar 3.0 op

ECTS Credits:

10 ECTS credits / 267 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 3 rd year. BS and ECO: scientific writing and Introduction to information retrieval autumn, workshop spring.

TEA: scientific writing, Introduction to information retrieval and workshop autumn

Learning outcomes:

B.Sc. seminar: Student will know the technical and ethical principles of scientific writing and publishing. She/he has the capability to make a scientific review (BSc thesis) and present it clearly as a poster or an oral presentation. *B.Sc. thesis:* Student is able to plan and write up thesis by getting acquainted to an interesting biology subject and reviewing it critically with the help of relevant scientific source material.

Contents:

Independent research work on a scientific subject in agreement with the responsible professor and under the supervision of the degree programme. The supervisors may be professors of the department, docents and other teachers and researchers who have the docent's status. The student may have several supervisors, the other supervisor may be from other department, university (also abroad) or from research institute. The subject must be agreed on with the professor in advance. The research work can contain fieldwork, laboratory work, theoretical work or work on collections in museum. The work always includes a literature survey. After having completed the thesis, the student writes the Maturity Exam. The dean will order the examiners by the proposal of the professor. Pro gradu working group accepts and grades the thesis on the basis of the examiners' opinions.

List of the actual B.Sc. thesis topics is on Noppa.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

BSc seminar: Info lectures, computer exercises, group and peer support, seminar or poster presentation. BSc thesis: About 15 pages long thesis.

Target group:

Compulsory to the biology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

Done at the same time as B.Sc. seminar workshop in spring, subject teacher students have seminar workshop in the autumn.

Recommended or required reading:

-

Assessment methods and criteria:

B.Sc. seminar: Tutorial group and presentation. *B.Sc. thesis:* Thesis.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

B.Sc. seminar: Doc. Seppo Rytönen. *B.Sc. thesis:* Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

750373A: Biogeography, 5 op

Voimassaolo: 01.08.2015 - 31.07.2019

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kvist, Laura Irmeli, Jari-Heikki Oksanen

Opintokohteen kielet: Finnish

Leikkaavuudet:

750173P Biogeography 5.0 op

750363A Biogeography 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 1st autumn.

Learning outcomes:

The course introduces students to basic concepts of biogeography, patterns of distribution and historical and present factors affecting the distribution. Plant biogeography introduces students to modern and historical factors controlling the plant cover, and to the special methods of vegetation science.

Contents:

The course consists of general part and optional part on plant biogeography and vegetation science. The general part introduces basic models and theories of distribution of organisms in the environment. Historical, evolutionary, geographical, climatic and ecological explanations. Research methods used in biogeography. The part on plant biogeography and vegetation science introduces methods on factors controlling the structure and composition of vegetation, and describes major vegetation types in Finland and principal biomes in the World. Methods of vegetation science are briefly surveyed.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

General biogeography: 24 h lectures, independent work (3 cr), **Plant biogeography:** 24 h lectures (2 cr); two exams.

Target group:

Compulsory for biology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

Other recommended courses related to the field: Basics of Ecology (750124P), Evolution and systematics of organisms (750372A), Evolution, systematics and morphology of organisms, practicals (750374A), Biodiversity in human changed environments (755631S).

Recommended or required reading:

Cox, C.B. & Moore, P.D. 2005: Biogeography. An ecological and evolutionary approach (7 ed.), Blackwell Publishing Ltd, or Cox, C.B. & Moore, P.D. 2010: Biogeography. An ecological and evolutionary approach (8 ed.), John Wiley & Sons Inc.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Two exams.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail. Final grade is average value of the two exams.

Person responsible:

Doc. Laura Kvist and Prof. Jari Oksanen.

Working life cooperation:

No.

Other information:

-

755320A: Developmental biology-histology, lectures, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

751367A Developmental biology-histology, lectures 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 1 st spring.

Learning outcomes:

After completing the developmental biology -part of the course the student is able to name the most important events of embryonic development and the structural changes related to them. The student is also able to describe the principles gene regulation related to embryonic development. After completing the histology-part of the course the student is able to describe the various tissue types and the microscopic structure of important organs and is also able to identify tissue types and organs from microscopic sections.

Contents:

Motto: "It is not birth, marriage, or death, but gastrulation, which is truly the most important time in your life." (Lewis Wolpert, 1986). Developmental biology will cover gametogenesis, fertilization, forming of embryonic tissue layers (gastrulation), embryonic induction, signal molecules and the differentiation of the most important tissues and organs (organogenesis). Histology will first cover various tissue types, their cell types and matrix composition. Thereafter, the microscopic structure and tissue composition of various organs and organ systems will be covered. In both parts, practical exercises on drawing from microscopic slides (see 755317A) will support lectures.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

38 h lectures and two exams.

Target group:

Compulsory to biology students.

Prerequisites and co-requisites:

Cell biology (750121P) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Lecture notes, lecture handouts. Recommended reading: Sariola, Frilander ym., Solusta yksilöksi: Kehitysbiologia, Duodecim, Helsinki 2003; Gilbert: Developmental Biology, Sinauer Press, 6.ed. 2000, or newer; Young & Heath: Wheater's Functional Histology, Churchill Livingstone, 4. ed. 2000, or newer. The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

2 lecture exams. Read more about [assessment criteria](#) at the University of Oulu webpage.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

MSc Henrika Honkanen.

Working life cooperation:

No.

Other information:

-

750372A: Evolution and systematics of organisms, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Marko Mutanen, Annamari Markkola, Jari-Heikki Oksanen

Opintokohteen kielet: Finnish

Leikkaavuudet:

750307A Evolution and systematics of organisms 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 2nd autumn.

Learning outcomes:

Students will learn a general picture of the diversity of life-forms as to understand the evolutionary history of organisms.

Contents:

The course provides an insight into the biological evolution and evolutionary processes reflected by the systematic classification of the organisms. Also basic principles and concepts of systematics and classification are presented.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

30 h lectures.

Target group:

Compulsory to the biology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

Lectures give basic ability to different biology subjects.

Recommended or required reading:

Net material and supplementary reading: Bell, P.R. & Helmsley, A.R. 2000: Green Plants. Their origin and diversity. 2nd ed. Cambridge University Press., Willis, K.J. & McElwain, J.C. 2002: The evolution of plants. Oxford University Press. Hickman, C. P. et al. 2009. Animal Diversity, 5th edition, McGraw Hill New York.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Lecture exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Arja Kaitala, Prof. Jari Oksanen and Doc. Annamari Markkola.

Working life cooperation:

No.

Other information:

-

750336A: Evolutionary ecology, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Sami Kivelä

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / (English).

Timing:

B.Sc. degree 2nd autumn.

Learning outcomes:

To understand main principles of evolution and the concepts of natural selection, fitness and adaptation. Learn basics of life-history adaptation, speciation processes and social evolution.

Contents:

The aim of the course is to introduce a student with lectures and seminars to the main topics of evolutionary ecology, for example basic concepts of natural selection and evolution, selection level, speciation, evolution of life cycles, interactions between and within species are included. Review to the latest research results.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

36 h lectures and compulsory seminars, exam.

Target group:

BS and ECO compulsory, TEAeco optional.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Additional reading: Björklund, Mats 2009 Evoluutiobiologia. Gaudeamus, Sterans, S. and Hoekstra, R. F. 2005: Evolution, An Introduction. Oxford University Press, New York, 575 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Seminar and exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Arja Kaitala.

Working life cooperation:

No.

Other information:

-

755333A: Identification of animals, 6 op

Voimassaolo: 01.08.2016 - 31.07.2019

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Koivula

Opintokohteen kielet: Finnish

Leikkaavuudet:

755334A Identification of animals, vertebrates 4.0 op

ECTS Credits:

6 ECTS credits / 162 hours of work.

Language of instruction:

Finnish / English

Timing:

B.Sc. degree 1st autumn and spring.

Learning outcomes:

Main point of the course is to learn to identify Finnish animal species (vertebrate) and families (invertebrate) from museum samples. Basics of species' ecology and classification of organisms.

Contents:

During the autumn semester (9 h lectures in Finnish, 16 h exercises, exam), the Finnish vertebrate fauna is studied using stuffed museum samples. In the spring semester (9 h lectures in Finnish, 16 h exercises, exam) the invertebrate taxons (mostly family- or genus-level) common in Finland are studied using museum samples.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

18 h lectures in Finnish, 32 h exercises, independent studying, 2 exams.

Target group:

Biology students: compulsory.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

This course is needed for attending courses Field course in terrestrial animals (755322A) and Field course in aquatic animals (755321A).

Recommended or required reading:

Course handouts, Itämies J. ja Viro P. 1995: Eläinten lajintuntemus, selkärangattomat, 73 p.; Putaala, A., Marjakangas, A. & Rytönen, S. 2001: Eläinten lajintuntemus, selkärangaiset, 42 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Two species exams.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Kari Koivula.

Working life cooperation:

No.

Other information:

-

*Compulsory***755333A-01: Basic identification of animals, vertebrate, 0 op**

Voimassaolo: 01.08.2016 - 31.07.2019

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Pudas, Tuula Kaarina, Kari Koivula

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

755333A-02: Basic identification of animals, invertebrate, 0 op

Voimassaolo: 01.08.2016 - 31.07.2019

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail
Opettajat: Marko Mutanen
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

756342A: Identification of plant species, 3 - 4 op

Voimassaolo: 01.08.2015 - 31.07.2017

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Annamari Markkola

Opintokohteen kielet: Finnish

Leikkaavuudet:

756355A	Identification of plant species, brief	3.0 op
750303A	Nature conservation and land use	3.0 op

ECTS Credits:

3-4 ECTS credits / 80-107 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 1st autumn. ECOGEN 1st autumn.

Learning outcomes:

Student is able to identify most common boreal plant species in herbarium specimens.

Contents:

Demonstrations (16 h) and/or independent study of ca. 350 vascular plants, mosses and lichens in the boreal vegetation zone. 3 cr. without the literature in the exam and 2 cr. with the literature in the exam. In the identification exam student has to know specimens scientific name and family in latin.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Demonstrations (16 h) and/or independent study of ca. 350 vascular plants, mosses and lichens in the boreal vegetation zone. 4 cr without the literature in the exam and 3 cr with the literature in the exam. In the identification exam student has to know specimens scientific name and family in latin.

Target group:

4 cr compulsory to TEA and ECO; 3 cr compulsory to BS.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

Course is prerequisite for the Field course in ecological botany (756343A) and for the advanced plant species identification courses.

Recommended or required reading:

Laitinen et al. 2012: Field course in ecological botany; Hanhela, P. & Halonen, P. 1995: Plant identification; Huttunen, A: 1995: Introduction to forest types; Euroola, S., Hicks, S. and Kaakinen, H. 1994: Key to Finnish mire types, pp. 12-117 in: Moore, P. D. (ed.), 1994 European mires, London Academic Press, London, 367 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Species exam. 4 cr without the literature and 3 cr with the help of the literature.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Annamari Markkola.

Working life cooperation:

No.

Other information:

-

757312A: Molecular evolution, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kuittinen, Helmi Helena

Opintokohteen kielet: Finnish

Leikkaavuudet:

753327A Molecular evolution 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English. Lectures are in Finnish, but non-speakers can make an exam based on literature.

Timing:

B.Sc. 2nd autumn.

Learning outcomes:

After the course the student knows some basic methods that are used to study the history of living organisms and their evolutionary mechanisms. The student knows the main concepts in the field and can read scientific articles in molecular evolution.

Contents:

Basic methods of estimation of nucleotide substitution rates, building of phylogenetic trees with distance based methods and parsimony. Evolution of the genome structure and size. Scientific articles.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

24 h lectures, 16 h exercises/seminar, 40 h independent studies exam.

Target group:

Compulsory for biology students.

Prerequisites and co-requisites:

Concepts of genetics (757109P) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Additional reading Graur, D. and Li, W.-H. 1999: Fundamentals of Molecular Evolution. Sinauer, Massachusetts.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Exam/home exam, homework, exercises.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Helmi Kuittinen.

Working life cooperation:

No.

Other information:

-

756346A: Plant biology lectures, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Anna-Maria Pirttilä, Häggman, Hely Margaretha

Opintokohteen kielet: Finnish

Leikkaavuudet:

752345A Basics of functional plant biology, lectures 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 2nd spring.

Learning outcomes:

The student can understand and explain the function and regulation of plant cells, tissues and entire plants.

Contents:

The most important phenomena of plant life, like photosynthesis, nitrogen metabolism and plant hormones are discussed.

Mode of delivery:

Face-to-face teaching, book exam.

Learning activities and teaching methods:

Lectures (20 h) and exams.

Target group:

Compulsory to the biology students.

Prerequisites and co-requisites:

Cell biology (750121P) or equivalent knowledge helps in following this course. This course is a prerequisite for course Plant biology practicals (756341A) and Advanced course in plant biology (752682S).

Recommended optional programme components:

-

Recommended or required reading:

Taiz, L. et al. 2015. Plant Physiology and Development. Sixth Edition. 761 p. Sinauer Associates, Inc. ISBN-9781605352558.

Terävä, E. & Kanervo, E. 2008: Kasvianatomia or equivalent.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Lectures, book, exams.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Hely Häggman and Doc. Anna Maria Pirttilä.

Working life cooperation:

No.

Other information:

-

756353A: Plant developmental biology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Häggman, Hely Margaretha

Opintokohteen kielet: Finnish

Leikkaavuudet:

756332A Plant developmental biology 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 3rd spring.

Learning outcomes:

The student has a comprehensive view on plant development and show knowledge of the recent methods used in the research of plant developmental biology.

Contents:

Modern methods in plant biology and especially the mutant or genetically modified plants have been in a key role to understand factors, mechanisms and regulation affecting plant development. The lectures include cell level information (cell division, growth and differentiation), embryo development, meristem formation and maintenance, organ development and cell death as a role of normal plant development. Moreover, the role of environmental factors in plant development will be covered.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Developmental biology 20 h lectures, home essay / seminar and final exam.

Target group:

Compulsory to BS and ECO, TEA: optional.

Prerequisites and co-requisites:

Basics of plant biology (756346A) is recommended as prerequisite.

Recommended optional programme components:

-

Recommended or required reading:

Lectures and supplementary material. Timmermans, M.C.P.: Plant Development. 2010. Elsevier.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Hely Häggman.

Working life cooperation:

No.

Other information:

-

755327A: Animal physiology exercises, 5 op

Voimassaolo: 01.08.2015 - 31.07.2017

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

755318A Animal physiology, exercises 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 3 rd autumn.

Learning outcomes:

Students know basic physiological methods and can design simple experiments.

Contents:

The laboratory course will familiarize students with the use of simple experimental trials, laboratory tests and computer aided measurements the physiological basic principles.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

32 h laboratory training, exam.

Target group:

BS compulsory, TEAbs optional.

Prerequisites and co-requisites:

Cell biology (750121P) and Animal physiology, lectures (751388A).

Recommended optional programme components:

This course is a prerequisite for the courses Comparative animal physiology (751x84A/S), and Advanced animal physiology (751635S).

Recommended or required reading:

Animal physiology course booklet.

Assessment methods and criteria:

Exam. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Working life cooperation:

No.

Other information:

-

757314A: Basics of bioinformatics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Lumi Viljakainen

Opintokohteen kielet: Finnish

Leikkaavuudet:

750340A Basics of bioinformatics 3.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. studies, 3rd autumn.

Learning outcomes:

After the course the student knows and is able to use the basic methods for handling the nucleotide and protein sequences. The aim is that the student learns how to use the databases, understands the background and principles of the analytic methods, is able to take up a critical attitude towards the used methods and gets a good background for applying new methods that are developed continuously.

Contents:

Searching of material from the databases, inferring the function of a gene and structure of a protein based on sequence data, comparing the sequences and evaluating the differences between them as well as examining the evolution history of the genes.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

12 h lectures, 2 h seminar, 20 h exercises, independent work.

Target group:

BT: compulsory, recommended for all biologists. Suitable also for biochemists.

Prerequisites and co-requisites:

Course Concepts of genetics (757109P) or equivalent knowledge also Molecular evolution (757312A) is recommended.

Recommended optional programme components:

-

Recommended or required reading:

Jonathan Pevsner 2009: Bioinformatics and Functional Genomics. Wiley-Blackwell.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Reports or exam, exercises, seminar presentation, independent work and student activity.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Lumi Viljakainen.

Working life cooperation:

No.

Other information:

-

757110P: Experimental course in general genetics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kuittinen, Helmi Helena

Opintokohteen kielet: Finnish

Leikkaavuudet:

753104P Experimental course in general genetics 6.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. degree, 1 st spring.

Learning outcomes:

After passing the course students have elementary knowledge of basic phenomena of genetics, important working methods and laboratory organisms. Student has the basic ability to understand, apply and analyse simple genetical works and phenomena.

Contents:

Investigation of Mendelian inheritance, gene mapping and nonadditive effects of genes using cross-breeding; basics of population genetics; investigation of promoter regulation and microbial recombination; investigation of mitosis and meiosis using cytogenetical methods; basic methods of DNA techniques (isolating DNA, digesting DNA using restriction enzymes, PCR and electrophoresis).

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

18 h demonstrations, 45 h exercises, independent work, exam, report.

Target group:

Compulsory for biology students.

Prerequisites and co-requisites:

Concepts of genetics (757109P) or equivalent knowledge.

Recommended optional programme components:

Course is prerequisite to all the following genetics courses.

Recommended or required reading:

Course handout.

Assessment methods and criteria:

Report, final exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Helmi Kuittinen

Working life cooperation:

No.

Other information:

-

757311A: Molecular methods I, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kuittinen, Helmi Helena

Opintokohteen kielet: Finnish

Leikkaavuudet:

750364A Molecular methods I 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

BS: B.Sc. 2nd autumn, ECOGEN 1st autumn

Learning outcomes:

After the course the student is able to use the basic methods of DNA work. The student can isolate DNA from different organisms, estimate the quality and quantity of the DNA, amplify DNA fragments with the polymerase chain reaction, design PCR primers and sequence DNA. The student is able to evaluate his results and optimize methods to some degree. The student can write a simple scientific report.

Contents:

Isolation of genomic DNA, amplification of DNA with PCR, primer design, DNA sequencing with the Sanger dideoxy method from a PCR product and from a cloned material. Computer programs needed for DNA-sequence and fragment analysis. Basic elements of a scientific report.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

48 h exercises including demonstrations, 85 h independent work including homework and reports.

Target group:

Compulsory to BS, suitable for ECO students who are interested in population and evolutionary ecology.

Prerequisites and co-requisites:

Concepts of genetics (757110P) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Reports.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail

Person responsible:

Doc. Helmi Kuittinen.

Working life cooperation:

No.

Other information:

-

756341A: Plant biology practicals, 5 op**Voimassaolo:** 01.08.2011 -**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Field of Biology**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Anna-Maria Pirttilä**Opintokohteen kielet:** Finnish**ECTS Credits:**

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 2nd spring.

Learning outcomes:

The student can differentiate the basic structures of higher plants at microscopic and macroscopic level and understands the relationship between structure and function.

Contents:

The student can interpret the meaning of structure behind function at microscopic and macroscopic level. After completing the course, the student is able to plan small physiological research projects and can analyze, interpret and report the results in a scientific form.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

45 h laboratory exercises. Exercises are done in pairs and reports are made as team work.

Target group:

BS: compulsory, TEAbs optional.

Prerequisites and co-requisites:

Cell biology (750121P) and Basics in functional plant biology, lectures (756346A).

Recommended optional programme components:

Basics in plant biology is prerequisite to Advanced course in plant biology (752682S).

Recommended or required reading:

Terävä, E. & Kanervo, E. 2008: Kasvianatomia or equivalent knowledge, Taiz, L. & Zeigler, E. 2010: Plant Physiology (parts), Sinauer Ass., Sunderland Mass.; Hohtola ym.: Harjoitustyömoniste.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Laboratory exercises, reports.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Anna Maria Pirttilä.

Working life cooperation:

No.

Other information:

-

757313A: Basics in population genetics, 5 op**Voimassaolo:** 01.08.2015 -**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Lumi Viljakainen

Opintokohteen kielet: Finnish

Leikkaavuudet:

753314A Basics in population genetics 8.0 op

ECTS Credits:

5 cr / 133 hours of work.

Language of instruction:

English.

Timing:

B.Sc. 2nd spring BSc, M.Sc. 1st spring, ECOGEN ECOz and ECOB BS. Introduction to Population genetics compulsory to B.Sc. in M.Sc. degree.

Learning outcomes:

This course introduces genetic theories, basics of phylogenetics and usage of molecular biology methods in ecology. The aim is that students know the basic methodology, can apply them into variety of genetic and ecological questions and is familiar with basics of population genetics and phylogenetics in order to be able to analyze and interpret genetic data.

Contents:

Basics of population genetics (variation, effective population size, bottlenecks, population structure, gene flow), relationships between molecular and adaptive variation, phylogenetic methods and phylogeography. Usage of molecular methods for identification of species, sex and individuals, behavioural ecology (mating systems, cooperation, mating success) and conservation.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Population genetics: 20 h lectures, 4 h seminars, 24 h exercises (problem solving, laboratory and computer exercises), report, essays, home exam, final exam.

Molecular ecology: 20 h lectures, 4 h seminars, 36 h exercises (laboratory and computer exercises), final exam.

Target group:

BS, ECO, ECOGEN.

Prerequisites and co-requisites:

Concepts of genetics (757109P) and Experimental course in general genetics (757110P) or equivalent knowledge ja Molekyyli evoluutio (757312A).

Recommended optional programme components:

Other related courses : *Population genetics:* Molecular evolution (757312A), before Quantitative genetics and plant and animal breeding (757616S). This course is a prerequisite to courses Experimental course in bioinformatics and molecular evolution (753624S), Bioinformatics (757619S), DNA analysis in population genetics (757618S).

Molecular ecology: Basics in population ecology (756351A) and Advanced course in population ecology (755626S).

Recommended or required reading:

Hedrick 2005: Genetics of populations 3. or 4. ed. Beebe, T and Rowe G. 2004 or 2008. An introduction to molecular ecology. Oxford University Press.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Population genetics: Home exam, final exam, seminar, essays, reports.

Molecular ecology: Final exam and seminar.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Lumi Viljakainen and Doc. Laura Kvist.

Working life cooperation:

No.

Other information:

Note that Introduction to Molecular ecology and Introduction to population genetics courses are alternative; students cannot get credits from both.

752388A: Basics of plant tissue culture, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Häggman, Hely Margaretha, Anna-Maria Pirttilä

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 2nd or M.Sc. 1st autumn.

Learning outcomes:

The course aims to help students learn to basic plant tissue culture concepts, to establish tissue culture systems and to understand totipotency.

Contents:

Preparation of culture media and establishment of sterile cultures starting from different plant organs and tissues. Students are able to understand how plant hormones affect differentiation of tissues.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

8 h lectures, 35 h demonstrations and exercises, essay, seminar.

Target group:

B.Sc. degree BS: optional, M.Sc. degree BSb: compulsory.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

Course gives ability to further studies in molecular biology.

Recommended or required reading:

Course handout the book: Neumann K-H, Kumar A, Imani J (2009): Plant Cell and Tissue Culture – A tool in Biotechnology.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Essay, exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Hely Häggman and Doc. Anna Mari Pirttilä.

Working life cooperation:

No.

Other information:

-

751384A: Comparative animal physiology, 8 op

Voimassaolo: - 31.07.2017

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Henriika Honkanen

Opintokohteen kielet: Finnish

ECTS Credits:

8 ECTS credits / 213 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 3rd or M.Sc. 1st spring.

Learning outcomes:

After completing the course the student is able to form a general view of the similarities and differences in vital physiological functions between different animal species. The understanding of the regulation mechanisms of these physiological functions will be expanded by practical experiments conducted with several different animal species.

Contents:

Comparative animal physiology will be studied through the central physiological themes (nervous system, muscles, metabolism, thermoregulation, reproduction, circulation). The lectures consist of an introductory lecture on the given subject, and seminars. Physiological, cell physiological, neurophysiological, and histochemical methods are used in practical works related to the above mentioned themes. In the experiments invertebrate animals, frog, birds and mammals, including human being, will be used.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

32 h lectures, 88 h laboratory work, 3 independent simulation or essay tasks, exam.

Target group:

B.Sc. degree optional to BS or M.Sc. degree compulsory to BSz.

Prerequisites and co-requisites:

Cell biology (750121P) and Animal physiology lectures and exercises (755323A, 755327A) or equivalent knowledge.

Recommended optional programme components:

Prerequisite for the course Advanced course in animal physiology (751635S).

Recommended or required reading:

Course handout. Willemer, Pat (2000) Environmental physiology of animals.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

M.Sc. Henrika Honkanen.

Working life cooperation:

No.

Other information:

-

750349A: Examinations on optional topics in biology, 2 - 10 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

751354A	Examinations on optional topics	2.0 op
752352A	Examination in optional topics	2.0 op
753351A	Examinations on optional topics	2.0 op

ECTS Credits:

2-10 ECTS credits / 53-267 hours of work.

Language of instruction:

Depends on the book.

Timing:

B.Sc. degree 2.-3. year or M.Sc. degree 1.-2. year.

Learning outcomes:

Student independently concerns him/herself to special issues in animal physiology or animal ecology.

Contents:

Examinations on books, which are not compulsory in any other course unit.

Mode of delivery:

Face-to face teaching.

Learning activities and teaching methods:

Book exam in Examinarium.

Target group:

-

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Literature chosen in agreement with the responsible person.

Assessment methods and criteria:

Book exam in Examinarium.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail or Pass / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

-

Other information:

-

756304A: Plant ecophysiology in changing environments, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Taulavuori

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 3rd or M.Sc. 1st spring.

Learning outcomes:

After finishing the course student understands interactions between plant and environment, and has become acquainted to most important experimental methods in physiological plant ecology and student can apply research parameters. Student can apply the knowledge to plant production and environmental protection issues.

Contents:

The aim of the course is to initiate the students into the basics of plant ecophysiology in changing environments. The physical, chemical (abiotic) and biotic factors in the environment affects plant's growth and survival. Plant ecophysiology is an experimental science, which studies the physiological functions and adjustments underlining the ecological observations from the viewpoint of growth and survival. Different environmental stresses restrict the plant growth. Plant ecophysiology is experimental science which studies the physiological functions and regulation mechanisms on growth, survival, abundance and distribution. Effects of abiotic and biotic factors are studied. How elevated temperature, CO₂, drought stress, nutrient imbalance, air pollutants, metals, UV radiation and plant pathogens affect on plants' gas exchange, primary metabolism, carbon allocation and growth. The exercises can also focus on the effects of environmental factors on photosynthesis, respiration, transport of photosynthetic products, water economy, energy economy and nutrient economy. Special features of ecophysiology of boreal plants are also dealt with.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

20 h lectures and demonstrations, 35 h exercises, exam, report, seminar.

Target group:

ECOb, BSb, Ph.D. students (if not in the undergraduate degree).

Prerequisites and co-requisites:

-
Recommended optional programme components:

Course is related both to plant ecology and plant physiology basic studies.

Recommended or required reading:

Hans Lambers, F. Stuart Chapin III, Thijs L. Pons 2008: Plant Physiological Ecology. Springer Verlag. 540 s. Second edition.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Seminar and report.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Kari Taulavuori.

Working life cooperation:

No.

Other information:

-

750313A: Research training, 2 - 15 op

Opiskelumuoto: Intermediate Studies

Laji: Practical training

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

1-15 ECTS credits / 27-405 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. degree.

Learning outcomes:

Student applies the education given knowledge and skills in working life to gain hands-on experience.

Contents:

Work on special projects in the different biology research groups at the department or elsewhere or independent project work including field and/or laboratory work or work at the biological stations. The work is not included to other study modules in biology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

The topic and the study plan have to be agreed on in advance (registration form). The student has to keep diary and prepare a report on the work.

Target group:

-

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Report.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Prof. Markku Orell, Prof. Jari Oksanen, Prof. Outi Savolainen and Prof. Hely Häggman.

Working life cooperation:

Yes. Participating to biology project will give working life skills.

Other information:

-

750377A: Winter ecology and physiology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Taulavuori

Opintokohteen kielet: Finnish

Leikkaavuudet:

750325A Winter ecology and physiology 3.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

English.

Timing:

B.Sc. 3 rd or M.Sc. 1 st spring. NNE.

Learning outcomes:

Student obtains basic knowledge of animal and plant acclimations and adaptations to winter, and can evaluate the effects of cold temperatures and snow on overwintering, and learns central methodology in winter ecology and physiology.

Contents:

Three independent units: 1) Winter ecology and physiology course (7 h lectures and 13 h laboratory practicals and 4 h seminar in Oulu, and 4 day long field excursion to the Oulanka Research Station (total about 50 h, 3 cr); 2) Book exam on a common exam day 2 cr: Marchand, P. J. 1996: Life in the cold. An introduction to winter ecology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures, exercises, report and seminar presentation.

Target group:

Biology students.

Prerequisites and co-requisites:

Courses Basics of ecology (750124P), Field course in ecological botany (752304A), Cell biology (750121P), Field course in terrestrial animals (751306A), Field course in aquatic animals (751307A) and Basics of functional plant biology, lectures (752345A) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Marchand, P. J. 1996: Life in the cold. An introduction to winter ecology. (3rd edition). University Press of New England. 304 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Seminar presentation and book exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Course + seminar: Pass / Fail, book exam: 1-5 / Fail.

Person responsible:

Doc. Kari Taulavuori.

Working life cooperation:

No.

Other information:

-

750380A: Working knowledge, 1 - 5 op

Voimassaolo: 01.08.2016 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

1-5 ECTS credit / 27-133 hours of work

Language of instruction:

Finnish /English.

Timing:

B.Sc. 1st spring-3rd spring.

Learning outcomes:

During the course student will get work experience and develop common working life skills as communication and organization skills and get to know work community and it's dynamics.

Contents:

Independent work for example in the summer job.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Student will keep diary of her/his tasks and hours which will be added to the report that the student will do. Report includes self assesment.

Target group:

B.Sc. students.

Prerequisites and co-requisites:

-

Recommended optional programme components:

Before Practical training (750615S).

Recommended or required reading:

-

Assessment methods and criteria:

Report and diary.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

Yes. Training in suitable tasks will develop student's working life skills.

Other information:

-

740144P: Biochemical Methodologies I, 8 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Biochemistry and Molecular Medicine

Arvostelu: 1 - 5, pass, fail

Opettajat: Jari Heikkinen

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay740153P Basic biochemistry 2: Methods (OPEN UNI) 2.0 op

740151P Biochemical methodologies I 10.0 op

740117P Basic methods in biochemistry 4.0 op

740136P Laboratory course in basic methods of biochemistry 3.0 op

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

8 credits

Language of instruction:

Finnish

Timing:

B.Sc. yr1 autumn (lectures), yr1 spring (laboratory practicals)

Learning outcomes:

Upon successful completion students are able to:

- use basic methods used in biochemical research laboratory
- Use laboratory equipment and work safely
- Prepare solutions used in the lab
- document experiments in the laboratory

Contents:

This module covers the basic methodologies used in practical biochemistry. The following topics will be addressed: safety in the laboratory, qualitative and quantitative observations, the calculations of concentrations and dilution factors (includes a workshop), pipette cleaning and calibration, identification and quantification of biological molecules, principles and practice of the use of centrifuges, spectrophotometry, SDS-PAGE, agarose gel electrophoresis, thin-layer and paper chromatography, basics of protein purification, extraction of chromosomal DNA from bacteria, mini-prep extraction of plasmid DNA, extraction of RNA from mammalian tissue, extraction of lipids from nutmeg, sterile technique, basic microbial growth, dialysis, filtration and pH measurement.

Mode of delivery:

Face to face teaching

Learning activities and teaching methods:

18 h le, 2h exercises, 120 h lab. Laboratory work is compulsory. It is possible to complete lecture part only (3.5 ECTS).

Target group:

Major students, Biology BSC-BS

Prerequisites and co-requisites:

Biomolecules, Biomolecules for Biochemists tai Biomolecules for Bioscientists

Recommended optional programme components:

-

Recommended or required reading:

Recommended reading: Reed, Holmes, Weyers & Jones: Practical skills in biomolecular sciences, 4th edition, Pearson, 2013.

You can check the availability of the course books via [this link](#)

Assessment methods and criteria:

Continuous assessment (home works, lab reports), final exam

Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

1-5/fail

Person responsible:

Jari Heikkinen

Working life cooperation:

No

Other information:

Location of instruction: lectures (in Finnish) at Linnanmaa campus, laboratory practicals at Kontinkangas campus.

740147P: Biomolecules for Bioscientists, 8 op**Opiskelumuoto:** Basic Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Tuomo Glumoff**Opintokohteen kielet:** English**Leikkaavuudet:**

ay740157P	Basic biochemistry 1: Biomolecules (OPEN UNI)	4.0 op
ay740152P	Basic biochemistry 1: Biomolecules (OPEN UNI)	5.0 op

740143P Biomolecules for Biochemists 8.0 op

740148P Biomolecules 5.0 op

ECTS Credits:

8 credits

Language of instruction:

English

Timing:

autumn-spring

Learning outcomes:

Upon successful completion students are able to:

- tell the composition, structure and function of the major groups of biomolecules in cells; nucleic acids, proteins, carbohydrates and lipids and describe the forces that modulate their function.
- apply information in the right context and evaluate it critically
- In addition, students on the 8op versions are able to work in the biochemical laboratory, are able to solve calculations and problems and are able to interpret the scientific data they generate

Contents:

This module provides an overview of biochemistry, outlining the forces involved in biomolecule structure and the chemical structures and properties of polynucleic acids, proteins, carbohydrates and lipids. There will also be an introduction to prebiotic evolution and a student debate on this subject. The module is arranged into lectures, workshops, a student debate and laboratory work. All of the exercises are in English. Both a final examination and continuous assessment will count towards the final mark and attendance of some parts is compulsory.

Mode of delivery:

Face to face teaching

Learning activities and teaching methods:

30 h lectures, 48 h lab., plus exercises

Target group:

Minor subject students

Prerequisites and co-requisites:

-

Recommended optional programme components:

-

Recommended or required reading:

Mathews, van Holde & Ahern: Biochemistry, (3rd edition), published by Addison Wesley Longman, Inc. or equivalent

Assessment methods and criteria:

Continuous assessment, final examination

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5/fail

Person responsible:

Tuomo Glumoff

Working life cooperation:

No

Other information:

This module is the same as Biomolecules for Biochemists except that there is the option for one of the exercises to be in Finnish. Location of instruction: Lectures: Linnanmaa, laboratory: Kontinkangas

740149P: Metabolism I, 4 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Biochemistry and Molecular Medicine

Arvostelu: 1 - 5, pass, fail

Opettajat: Tuomo Glumoff

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay740158P Basic biochemistry 3: Metabolis (OPEN UNI) 4.0 op

ay740154P Basic biochemistry 3: Metabolis (OPEN UNI) 3.0 op

740146P Metabolism I 6.0 op

ECTS Credits:

4 credits

Language of instruction:

Finnish

Timing:

spring

Learning outcomes:

Students will be able to explain the main principles of how the metabolism is made up, will get a detailed picture of the energy metabolism, and will be able to organize part of the wholeness of metabolism, particularly how energy metabolism is networked to the synthesis and degradation of biomolecules.

Contents:

On this course the central concepts and mechanisms of metabolism, its regulation and the integration of metabolic pathways will be introduced, like anabolism and catabolism, linking of different pathways, and metabolic regulation. Especially the energy metabolism will be studied, concerning carbohydrates, lipids and the respiratory chain. Combined with the course Metabolism II the students will get a good overview on the principles of metabolism, metabolic integration and the methods to study metabolism.

Mode of delivery:

Face to face teaching

Learning activities and teaching methods:

Lectures (28 h), problem-based exercises (workshops) 6 h and final exam.

Target group:

Minor subject students

Prerequisites and co-requisites:

Biomolecules for Biochemists or Biomolecules for Bioscientists or Biomolecules

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

1-5/fail. Problem-based exercises and a final exam will count towards the final grade.

Person responsible:

Tuomo Glumoff

Working life cooperation:

-

Other information:

This module is the same as Metabolism I (740146P), except that it contains no laboratory component.

Location of instruction: Linnanmaa**740374A: Microbiology, 3 op****Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Pospiech, Helmut**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

740363A	Microbiology	6.0 op
740322A	Microbiology	3.0 op

ECTS Credits:

3 credits

Language of instruction:

English

Timing:

spring

Learning outcomes:

Learning outcomes: Upon successful completion students are able to:

- define the typical features of bacteria, archaea, fungi and virus and explain the diversity of different groups of microorganisms
- explain the basic aspects of microbial metabolism
- understand the basics of microbial growth, enrichment, culture and growth control both in the environment and in contained culture
- explain the essential roles of microorganisms in our environment
- apply their knowledge for the growth and its control of standard laboratory microorganisms
- have a basic understanding of the industrial use of microorganisms or microbial compounds.

Contents:

This module is an introduction to general and applied microbiology and consists of lecture and laboratory exercises. In the lectures, the diversity and classification of micro organisms, especially bacteria will be introduced. Further topics are the structure and function of the prokaryotic cell, bacterial growth, metabolism and physiology, the importance of bacteria in different ecosystems as well as the industrial use of bacteria.

Mode of delivery:

Face to face teaching

Learning activities and teaching methods:

24 h lectures

Target group:

Minor subject students

Prerequisites and co-requisites:

-

Recommended optional programme components:

-

Recommended or required reading:

M. Salkinoja-Salonen (toim.) (2002) Mikrobiologian perusteita, Helsingin yliopisto; M.T. Madigan, J. M. Martinko, J. Parker (2010) Brock biology of microorganisms, 13th ed. Prentice Hall International.

Assessment methods and criteria:

Continuous assessment (home works), final exam

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5/fail

Person responsible:

Helmut Pospiech

Working life cooperation:

No

Other information:

This module is the same as Microbiology (740363A) except that it contains no practical component. Location of instruction: Linnanmaa campus

740373A: Molecular Biology I, 4 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Faculty of Biochemistry and Molecular Medicine

Arvostelu: 1 - 5, pass, fail

Opettajat: Mirva Saaranen

Opintokohteen kielet: Finnish

Leikkaavuudet:

740361A Molecular Biology I 8.0 op

740318A Molecular Biology 4.0 op

ECTS Credits:

4 credits

Language of instruction:

Finnish

Timing:

autumn

Learning outcomes:

After this course students should understand modern molecular biology methods.

Contents:

The course covers gene structure, DNA replication, recombination, transcription and translation. The student will learn the most common recombinant DNA techniques, such as PCR, use of restriction endonucleases, preparation of recombinant plasmids and DNA sequencing.

Mode of delivery:

Face to face teaching

Learning activities and teaching methods:

20 h lectures, 4 h computer exercise and homeworks

Target group:

Minor subject students

Prerequisites and co-requisites:

-

Recommended optional programme components:

-

Recommended or required reading:

Mathews, CK, van Holde KT, Applins DR, Anthony-Cahill SJ: Biochemistry (4th edition). Optional.

Assessment methods and criteria:

Homeworks 50%, final exam 50%

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5/fail.

Person responsible:

Mirva Saaranen and Aki Manninen

Working life cooperation:

no

Other information:

This course is the same as Molecular biology I (740361A) but without practical part.

Location of instruction: Linnanmaa

902002Y: English 1 (Reading for Academic Purposes), 2 op

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Proficiency level:

B2/C1 on the [Common European Framework of Reference](#) scale.

Status:

This course is mandatory for students of the following degree programmes:

Faculty of Science

- Biology
- Chemistry
- Mathematical Sciences
- Physics

Oulu Mining School

- Geosciences degree programme

Faculty of Information Technology and Electrical Engineering

- Department of Information Processing Science

Students in the Department of Geography take English 3.

Engineering students in the following programmes take their English courses in the Faculty of Technology:

Oulu Mining School:

- Mining Technology and Mineral Processing degree programme

Faculty of Information Technology and Electrical Engineering

- Department of Electrical Engineering
- Department of Communications Engineering

•Department of Computer Science and Engineering

Please consult the Faculty Study Guide to establish the language requirements for your own degree program.

Required proficiency level:

English must have been the A1 or A2 language at school or equivalent English skills should have been acquired otherwise.

ECTS Credits:

2 ECTS credits (total work load 54 hours including classroom meetings.)

Language of instruction:

English

Timing:

Biology: 1st year spring term

Chemistry: 1st year autumn term

Geology: 1st year spring term

Information Processing Science: 1st year spring term

Mathematical Sciences (pedagogy): 1st year spring term

Mathematical Sciences: 2nd year autumn term

Physical Sciences: 1st year autumn term

Learning outcomes:

By the end of the course, you are expected to be able to

- have acquired effective vocabulary learning techniques
- be able to distinguish parts of words to infer meanings
- utilize your knowledge of text structure and cohesion markers to understand academic texts
- extract information and learn content from English readings in scientific and professional contexts

Contents:

The course will focus on reading strategies; these include recognizing how texts are organized, identifying key points in a text, and understanding words in context. Vocabulary work in the course will focus on a) academic vocabulary, as used in formal scientific writing, and b) using your knowledge of the meanings of parts of words (affixes) to infer meaning.

Mode of delivery:

Contact teaching

Learning activities and teaching methods:

The scope of the course is 2 op (54 hours student workload).

Target group:

1st year students of Biology, Chemistry, Geology, Information Processing Science, Physics, and Mathematics (pedagogy); 2nd year students of Mathematics

Prerequisites and co-requisites:

-

Recommended optional programme components:

Students are also required to take 902004Y Scientific Communication, which is taken AFTER completion of this course.

Recommended or required reading:

Photocopies will be provided by the teacher and/or required texts will be accessible online or from the university library.

Assessment methods and criteria:

Student work is monitored by continuous assessment. You are required to participate regularly and actively in all contact teaching provided, and successfully complete all required coursework. There will be three monthly tests on material covered so far.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass/Fail

Person responsible:

Karen Niskanen

Working life cooperation:

-

Other information:

N.B. Students with grades *laudatur* or *eximia* in their A1 English school-leaving examination can be exempted from this course and will be granted the credits by the Faculty of Science.

902004Y: English 2 (Scientific Communication), 2 op

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Leikkaavuudet:

ay902004Y English 2 (Scientific Communication) (OPEN UNI) 2.0 op

Proficiency level:

B2/C1 on the CEFR scales

Status:

This course is mandatory for all 2nd year students (except **geographers**) who will have English as their foreign language in their B.Sc. degree. This includes the students who were exempted from 'Reading for Academic Purposes'(902002Y). Please consult the faculty study guide to establish the language requirements on your own degree programme.

Required proficiency level:

Students taking this course must have had English as the A1 or A2 language at school or the equivalent English skills should have been acquired otherwise. The course 'Reading for Academic Purposes' (902002Y) is a pre-requisite, unless exempted.

ECTS Credits:

The student workload is 53 hrs work/ 2 ECTS credits.

Language of instruction:

English

Timing:

Biology: 2nd year autumn term

Chemistry: 2nd year spring term

Geology: 2nd year spring term

Information Processing Science : 2nd year autumn term

Mathematics: 2nd year spring term

Physics: 2nd year autumn term

Learning outcomes:

By the end of the course, you are expected:

1. to have demonstrated your use of appropriate strategies and techniques for communicating effectively in English in an academic context.
2. to have demonstrated the ability to prepare and present scientific subjects to your classmates, using appropriate field-related vocabulary.

Contents:

Skills in listening, speaking, and presenting academic topics are practised in the classroom, where there is an emphasis on working in pairs and small groups. Homework tasks include online lecture listening and reading, preparation for classroom discussions and written work to support the classroom learning.

Mode of delivery:

Contact teaching

Learning activities and teaching methods:

Contact teaching 28 hours, homework 28 hours

Target group:

2nd year students of Biology, Chemistry, Geology, Information Processing Science, Mathematics, Physics

Prerequisites and co-requisites:

-

Recommended optional programme components:

Also required: [902002Y Reading for Academic Purposes Englannin kieli 1](#)

Recommended or required reading:

Course materials will be provided by the teacher.

Assessment methods and criteria:

Continuous assessment is based on regular attendance, active participation in all lessons and the successful completion of all homework tasks.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / fail.

Person responsible:

Karen Niskanen

Working life cooperation:

-

Other information:

-

750031Y: Orientation course for new students, 1 op**Voimassaolo:** - 31.07.2017**Opiskelumuoto:** General Studies**Laji:** Course**Vastuuyksikkö:** Field of Biology**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Vanhatalo, Minna-Liisa**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

750032Y Orientation course for new students 2.0 op

ECTS Credits:

1 ECTS credit / 27 hours of work

Language of instruction:

Finnish.

Timing:B.Sc. 1st autumn - spring.**Learning outcomes:**

The aim of the course is to introduce new biology students to the university, academic studies, the department and the studies of biology, give knowledge of the social relevance of the degree programme and student is able to set own goals for the studies.

Contents:

Students orientate themselves with the help of group meetings, presentations and seminar to the academic studies. During the course students make their first personal study plan (HOPS) for the first study year.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Tutorials, presentations and seminar of major subjects, independent studying, total 30 h.

Target group:

Compulsory to the biology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Study guide.

Assessment methods and criteria:

Participation to the tutorials, presentations, seminar and doing the personal study plan for the first year.

Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

Pass / Fail.

Person responsible:

Ph.Lic. Minna Vanhatalo.

Working life cooperation:

No.

Other information:

-

901004Y: Swedish, 2 - 3 op**Voimassaolo:** 01.08.1995 -**Opiskelumuoto:** Language and Communication Studies**Laji:** Course**Vastuuyksikkö:** Languages and Communication

Opintokohteen kielet: Swedish

Leikkaavuudet:

- 901035Y Second Official Language (Swedish), Oral Skills 1.0 op
- 901034Y Second Official Language (Swedish), Written Skills 1.0 op
- ay901004Y Swedish (OPEN UNI) 2.0 op

Ei opintojaksokuvauksia.

300003Y: Activities in university and student organizations, 1 - 4 op

Voimassaolo: 01.01.2010 -

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Faculty of Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

Ei opintojaksokuvauksia.

750033Y: Tutorial for new students, 1 op

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Vanhatalo, Minna-Liisa

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

1 ECTS credit / 27 hours of work

Language of instruction:

Finnish.

Timing:

B.Sc. 3rd autumn / M.Sc. 1st autumn.

Learning outcomes:

Course develops students' skills to guide, make presentations, work in group and organize. It also advances planning, arrangement and guidance abilities as well as responsibility.

Contents:

The student guides a group of new students during the orientation course introducing them to the university, academic learning environment, the department, curriculum and other students with the help of small group meetings and presentations.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Tutorials and presentations. Minimum 15 hours. In addition independent work includes the preparation of the tutorials.

Target group:

Second and third year biology students.

Prerequisites and co-requisites:

Course 750031Y.

Recommended optional programme components:

-

Recommended or required reading:

Study guide and training material.

Assessment methods and criteria:

Tutoring report.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Ph.Lic. Minna Vanhatalo.

Working life cooperation:

No.

Other information:

-

806119P: A Second Course in Statistics, 5 op

Voimassaolo: 01.06.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opettajat: Jari Pääkkilä

Opintokohteen kielet: Finnish

Leikkaavuudet:

806113P	Introduction to Statistics A	5.0 op
806109P	Basic Methods in Statistics I	9.0 op

ECTS Credits:

5 ECTS credits

Language of instruction:

Finnish

Timing:

4th period

Learning outcomes:

Upon completion of the course, student will be able to

- analyze continuous and categorical response in the most common experimental and observational studies
- critically evaluate scientific articles
- implement and interpret analyses of a statistical software concerning issues of the course.

Contents:

- Skills for performing statistical analyses and inferences on the basis of data obtained in common experimental and observational studies are expanded and deepened
- statistical literacy of scientific articles with quantitative methods

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Total 50 h face-to-face teaching including lectures and exercise (partly computer exercises). Independent work 83 h.

Target group:

Minor students

Prerequisites and co-requisites:

The recommended prerequisite prior to enrolling for the course is the completion of the course: 806118P Introduction to Statistics or 806116P Statistics for Economic Sciences.

Recommended optional programme components:

After the course, student is able to continue other statistics courses.

Recommended or required reading:

Lecture notes

Assessment methods and criteria:

Mid-term exams and/or final exam and possible homework.

Grading:

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

Person responsible:

Jari Pääkkilä

Working life cooperation:

No

Other information:

-

780120P: Basic Principles in Chemistry, 5 op

Voimassaolo: 01.08.2016 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

780117P General and Inorganic Chemistry A 5.0 op

780109P Basic Principles in Chemistry 4.0 op

ECTS Credits:

5 credits/134 hours of work

Language of instruction:

Finnish

Timing:

1st autumn

Learning outcomes:

Upon completion of the course, the student will be able to display an understanding of basic chemistry phenomenon; equilibrium of acids and bases, chemical equilibrium, redox reactions and stoichiometry.

Contents:

Introduction to chemistry, stoichiometry, redox reactions, chemical equilibrium, the equilibrium of acid and bases, buffer solutions, titration, thermodynamics.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

40 hours of lectures and 94 hours of self-study

Target group:

Biology, Geology, Process Engineering, Environmental Engineering compulsory. Geography, optional.

Prerequisites and co-requisites:

The compulsory course in upper secondary school chemistry (1st course)

Recommended optional programme components:

The course is not included in the 25 ECTS credits entity of chemistry!

Recommended or required reading:

Tro, N.J., Principles of Chemistry. A Molecular Approach, Pearson, 3. edition, 2016

Assessment methods and criteria:

Final examination. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.

Person responsible:

Lecturer Minna Tiainen

Working life cooperation:

No

Other information:

No

030005P: Information Skills, 1 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Technology

Arvostelu: 1 - 5, pass, fail

Opettajat: Sassali, Jani Henrik, Ursula Heinikoski

Opintokohteen kielet: Finnish

Leikkaavuudet:

030004P Introduction to Information Retrieval 0.0 op

ECTS Credits:

1 ECTS credit

Language of instruction:

Finnish

Timing:

2nd or 3rd year

Learning outcomes:

Students know the different phases of information retrieval process and basic techniques of scientific information retrieval. They will find the most important reference databases of their discipline and know how to evaluate information sources and retrieval results.

Contents:

Retrieval of scientific information, the retrieval process, key databases of the discipline, and evaluation of information retrieval and information sources.

Mode of delivery:

Blended teaching: classroom training, web-based learning material and exercises in Optima environment, a final assignment on a topic of the student's own choice

Learning activities and teaching methods:

Training sessions 8h, group working 7h, self-study 12h

Target group:

Compulsory for all students of the Faculty of Technology, the Faculty of Information Technology and Electrical Engineering and the Faculty of Architecture. In the Faculty of Science compulsory for students of biology, physics, geosciences, chemistry and geography. Optional for students of biochemistry and mathematics.

Prerequisites and co-requisites:

-

Recommended optional programme components:

-

Recommended or required reading:

Web learning material <https://wiki oulu.fi/display/030005P>.

Assessment methods and criteria:

Passing the course requires participation in the training sessions and successful completion of the course assignments.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

pass/fail

Person responsible:

Science and Technology Library Tellus, tellustieto (at) oulu.fi

Working life cooperation:

-

Other information:

-

780116P: Introduction to Organic Chemistry, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay780116P Introduction to Organic Chemistry (OPEN UNI) 5.0 op

780103P2 Organic Chemistry I 6.0 op

780108P Basic Course in Organic Chemistry 6.0 op

780112P Introduction to Organic Chemistry 4.0 op

780103P Introduction to Organic Chemistry 6.0 op

ECTS Credits:

5 credits / 134 hours of work

Language of instruction:

Finnish. Book-examination in English as well.

Timing:

1st autumn and 1st spring

Learning outcomes:

After this course, the student can explain organic chemistry fundamentals, basic concepts and terminology, can use them for the description of organic chemistry phenomena. He/she can name organic structures, explain their properties, deduce basic reaction types and solve their mechanisms.

Contents:

Basic reactions of organic compounds, basic principles of stereochemistry and reaction mechanisms: Addition, elimination, substitution, including electrophilic aromatic substitution, reactions of carbonyl group.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

40 hours of lectures plus 10 hours of exercises, 80 hours of independent self-study

Target group:

Biochemistry, Chemistry, Biology, Process Engineering, Environmental Engineering and in the study entity of 25 credits, compulsory.

Physical Sciences, Geology, Geography, Mathematical Sciences, optional.

Prerequisites and co-requisites:

Upper secondary school chemistry

Recommended optional programme components:

The course is an independent entity and does not require additional studies carried out at the same time.

Recommended or required reading:

Hart, H., Hart, D.J. and Craine, L.E.: Organic Chemistry: A Short Course, 10th ed. or the newer edition, Houghton Mifflin Boston, 1999; Hart, H., Hart, D.J. and Craine, L.E.: Study Guide & Solutions Book, Organic Chemistry: A Short Course, 10th ed. or the newer edition, Houghton Mifflin Boston, 1999.

Assessment methods and criteria:

Two intermediate examinations or one final examination.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.

Person responsible:

Dr. Johanna Kärkkäinen

Working life cooperation:

No

Other information:

No

806118P: Introduction to Statistics, 5 op

Voimassaolo: 01.06.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opettajat: Jari Pääkkilä

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay806118P Introduction to Statistics (OPEN UNI) 5.0 op

806113P Introduction to Statistics A 5.0 op

ECTS Credits:

5 ECTS credits

Language of instruction:

Finnish

Timing:

3rd period

Learning outcomes:

After completing the course, student will be able to

- consider issues influencing to data collection
- describe data by appropriate methods (tables, statistics and graphical presentations)
- evaluate the effect size of the sample to the margin of error for instance in Gallup polls and in different market researches
- interpret output of a statistical software.

Contents:

- collecting data, e.g. sampling
- variables and measuring
- descriptive statistical methods and their selection
- margin of error of estimator for population mean and proportion
- statistical literacy
- basic analysis of data using statistical software

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Total 50 h face-to-face teaching including lectures and exercise (partly computer exercises). Independent work 83 h.

Target group:

Minor students

Recommended optional programme components:

After the course, student is able to continue other statistics courses.

Recommended or required reading:

Lecture notes

Assessment methods and criteria:

Mid-term exams and/or final exam and possible homework.

Grading:

Fail, 1-5

Person responsible:

Jari Pääkkilä

Working life cooperation:

No

Other information:

-

750124P: Basics of ecology, 5 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Jari-Heikki Oksanen, Orell, Markku Ilmari

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 1st spring.

Learning outcomes:

After completion of the course both biology and minor studies students understand better function of nature and the ecological phenomena in individual, population, community and ecosystem level.

Contents:

The course gives a student a basic idea about ecological interactions in individual-, population-, community- and ecosystem levels. In individual level the focus is on environmental demands of plants and animals. In population level the birth- and death rate of age groups and their effect on population growth is focused. In interactions between different species the emphasis is on how the competition between species leads to differentiation of niches.

Predation is viewed as the regulatory effect on the population dynamics of prey populations. In community level the biodiversity and the patterns of succession are the main questions. In ecosystem level the emphasis is on energy flows and nutrient cycling. Evolution and adaptation are important in different fields of ecology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

The course is divided into three parts which follow the course book Krebs, C. J. 2009: Ecology (6th edition). 1st part: 24 hours of lectures based mainly on parts 1-2 of the course book. 2nd part: 24 hours of lectures are based on part 3 of the course book. 3rd part: students read the part 4 from the course book. In the course exam, there will be three questions, one from each part and all the questions have to be passed.

Target group:

Compulsory biology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Krebs, C. J. 2009: Ecology (6th edition). Part I.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Markku Orell and Prof. Jari Oksanen.

Working life cooperation:

No.

Other information:

-

750121P: Cell biology, 5 op

Voimassaolo: - 31.07.2020

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Häggman, Hely Margaretha, Henrika Honkanen, Kuittinen, Helmi Helena, Jaana Jurvansuu

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 1st autumn.

Learning outcomes:

The student is familiar with cellular structure and functioning in plant and animal cells, understands the social structures in multicellular species and knows why and how the genetic organizations (in nucleus, chloroplast and mitochondria) are co-operating, maintaining and regulating the cellular metabolism. Student understands the common origin and evolution of life on planet Earth, and understands the material basis and mechanisms of this continuity.

Contents:

During the recent years especially the development of molecular and microscopic and imaging techniques has increased our knowledge on cells and their social interactions. The structural and functional characteristics of plant and animal cells will be covered as well as the genetic organization maintaining and regulating the system.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

50 h lectures, three exams (zoology, plant biology, genetics). Home essays and internet material.

Target group:

Compulsory to the biology and biochemistry students.

Prerequisites and co-requisites:

Good basics in biology from elementary school.

Recommended optional programme components:

Cell biology is prerequisite for the following courses: Developmental biology-histology (755320A), Animal physiology (755323A), Plant biology lectures (756346A), Concepts of genetics (757109P). Course also gives readiness for studies in molecular biology and biochemistry.

Recommended or required reading:

Suitable parts of Campbell et al. 2014: Biology: a global approach (10e), Pearson, 1350 s. 978-1-292-00865-3, Alberts, B. et al. 2014: Molecular Biology of the Cell (6e), Garland Science Publishing, London, 1464 s. ISBN: 9780815345244 (or Lodish et al. 2012: Molecular Cell Biology (7e). Freeman, 973 s. ISBN-10: 1-4292-3413-X), Heino J. & Vuento M. 2014: Biokemian ja solubiologian perusteet (3. painos) WSOY Pro Oy, Helsinki, Jones R. et al. 2013: The molecular life of plants. Wiley-Blackwell, 742 s. ISBN : 978-0-470-87012-9.

The availability of the literature can be checked from [this link](#).

[\[HK1\]](#)linkkiä en osannut uudistaa

Assessment methods and criteria:

Three exams.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail. Final grade is average value of the three exams.

Person responsible:

Dr. Jaana Jurvansuu, Dr. Helmi Kuittinen and Prof. Hely Häggman.

Working life cooperation:

No.

Other information:

-

757109P: Concepts of genetics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Savolainen Outi

Opintokohteen kielet: Finnish

Leikkaavuudet:

757122P Concepts of genetics for biochemists 3.0 op

753124P Concepts of genetics 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 1 st spring.

Learning outcomes:

To understand and apply basic concepts of genetics, at Mendelian and molecular level.

Contents:

Part 1. Mendelian genetics, including the ideas of quantitative and population genetics. Part 2. Molecular genetics: replication, transcription, translation, genetic code, mutations, repair of DNA. Part 3. Selected topics on developmental genetics, and genetics of health and diseases.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

50 h lectures and seminars, 83 h independent studies, exam.

Target group:

Compulsory to the biology students (5 cr) Biochemistry students: parts 1 and 3 (3 cr) compulsory.

Prerequisites and co-requisites:

Cell biology (750121P) or equivalent knowledge.

Recommended optional programme components:

This course is prerequisite to all other genetics courses.

Recommended or required reading:

Materials are in Optima. Klug et al. 2012. Concepts of Genetics (10. ed). Pearson, 896 p. Alberts, B. et al. 2008: Molecular Biology of the Cell (5. ed). Garland Science Publishing, London, 1268 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Homeworks, home exams, lecture diary, exams.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

757110P: Experimental course in general genetics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kuittinen, Helmi Helena

Opintokohteen kielet: Finnish

Leikkaavuudet:

753104P Experimental course in general genetics 6.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. degree, 1 st spring.

Learning outcomes:

After passing the course students have elementary knowledge of basic phenomena of genetics, important working methods and laboratory organisms. Student has the basic ability to understand, apply and analyse simple genetical works and phenomena.

Contents:

Investigation of Mendelian inheritance, gene mapping and nonadditive effects of genes using cross-breeding; basics of population genetics; investigation of promoter regulation and microbial recombination; investigation of mitosis and meiosis using cytogenetical methods; basic methods of DNA techniques (isolating DNA, digesting DNA using restriction enzymes, PCR and electrophoresis).

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

18 h demonstrations, 45 h exercises, independent work, exam, report.

Target group:

Compulsory for biology students.

Prerequisites and co-requisites:

Concepts of genetics (757109P) or equivalent knowledge.

Recommended optional programme components:

Course is prerequisite to all the following genetics courses.

Recommended or required reading:

Course handout.

Assessment methods and criteria:

Report, final exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Helmi Kuittinen

Working life cooperation:

No.

Other information:

-

755323A: Animal physiology, 5 op

Voimassaolo: 01.08.2015 - 31.07.2020

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

751388A Animal physiology, lectures 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 2nd spring.

Learning outcomes:

After completing the course the student is able to form a general view of animal body functions, the regulation of organ systems, and the background of human health and diseases.

Contents:

Course focus on the basic problematic of physiological themes including nervous system, muscles, circulation, nutrition, metabolism, immune system, hormones and reproduction physiology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

50 h lectures and independent studying, mid-semester exams, home essays.

Target group:

Compulsory to the biology students.

Prerequisites and co-requisites:

Cell biology (750121P) or equivalent knowledge.

Recommended optional programme components:

This course is a prerequisite for the courses Animal physiology, exercises (755318A), Comparative animal physiology (751x84A/S) and Advanced course in animal physiology (751635S).

Recommended or required reading:

Reece, J.B. Urry, L.A. Cain, M.L., Wasserman, S.A. Minorsky, P.V. & Jackson R.B. 2011: Campbell Biology (9e). Pearson, Global Edition, 1309 p, handouts. The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Home essays and exam. Read more about [assessment criteria](#) at the University of Oulu webpage.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Esa Hohtola.

Working life cooperation:

No.

Other information:

-

750366A: Bachelor of Science final examination, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 3rd year.

Learning outcomes:

Student will understand basic methods, results and theories in ecology, physiology or genetics.

Contents:

Examinations on books related to B.Sc. thesis subject. List of books are presented on WebOodi. All the books are recommended to be done on the same exam in Examinarium.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Students make workshops where they discuss content of the books. Book exam (4 h). Exam is held in Examinarium.

Target group:

Compulsory to the biology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

BSz:

- Option 1: Randall etc.: Eckert's Animal Physiology, 5. ed., 2002 or newer, (chapter 4 onwards).
 - Option 2: Richard W. Hill, Gordon A. Wyse, and Margaret Anderson: Animal Physiology, 2. ed., Sinauer Press, 2008.
- Other books can be agreed on special reasons with prof. Esa Hohtola.

BSg

- Klug, W. S., Cummings, M. R., Spencer, C.A ja Palladino M.A.: Concepts of Genetics (11. ed.). Pearson & Prentice Hall, 2015
- Remember to mention the book edition to the teacher which book edition you read.
- responsible teacher dos. Helmi Kuittinen

BSb

- Option 1: Ridge, I. 2002. Plants. Oxford University Press, 344 p. ISBN 0-19-925548-2
- Option 2: Mauseth, J.D. 2009. An introduction to plant biology. 4th ed.
- Other books can be agreed on special reasons with prof. Hely Häggman.

ECOz

Exam book ensemble (5 cr.) is chosen from the following list:

- Bennett, P.M. & Owens, I.P.F. 2002. Evolutionary ecology of birds. Life histories, mating systems and extinction. – Oxford University Press. 206 p. (2 cr)
- Hanski, I. 2007. The Striking world. (2 cr.)
- Davies, N.B. Krebs, J.R. & West, S.A. 2012. An introduction to behavioural ecology. – Blackwell, 441 p. (4 cr).
- Mayr, E. 1999. Biologia. Elämän tiede. – Art House, 327 p. (2 cr)
- Primack, R.B. 2012. A primer of conservation biology (4. ed.). – 309 p. (2 cr).
- Smith, J.N.M., Keller, L.F., Marr, A.B. & Arcese, P. 2006. Conservation and biology of small populations. – Oxford University Press. 205 p. (2 cr)
- Other books can be agreed on special reasons with prof. Markku Orell

ECOb

- Larcher W. 2003. Physiological Plant Ecology 4th edition, 513 p.
- Ridge I. (Ed.) 2002. Plants. Oxford University Press, 345 p.

- Salonen V. 2006. Kasviekologia. 306 p., WSOY.
- Willis K.J. and McElwain J.C. 2002. The evolution of plants. 378 p. Oxford University Press.
- Scott Peter 2008. Physiology and Behaviour of Plants. Wiley, 305 p.
- Timonen, S & Valkonen, J. 2013. Sienten biologia. Gaudeamus, 448 p.
- Other books can be agreed on special reasons with prof. Jari Oksanen

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Exam in Examinarium.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

M.Sc. Henrika Honkanen, Prof. Hely Häggman, Prof. Jari Oksanen, doc. Helmi Kuittinen and Prof. Markku Orell.

Working life cooperation:

No.

Other information:

-

750332A: Bachelor of Science maturity exam, 0 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

0 ECTS credits / 2-4 hours of work.

Language of instruction:

Finnish / Swedish / English.

Timing:

B.Sc. degree.

Learning outcomes:

The student is well acquainted with the subject of the thesis and shows good first language skills.

Contents:

After completing the Bachelor of Science Thesis, the student writes an essay in his/her native language on the thesis, to show a good command of the language and the topic of the thesis. Maturity exam will be done in Examinarium.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Detailed instructions on Noppa. Four pages long essay exam. One teacher examine the maturity exam and Pro gradu working group accepts it. 4 h exam.

Target group:

Compulsory to the biology students. Exam is taken after completion of the thesis.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Four pages long essay. Done in Examinarium.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

750376A: Bachelor of Science seminar and thesis, 10 op**Voimassaolo:** 01.08.2015 -**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Field of Biology**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

750396A Bachelor of Science seminar 3.0 op

ECTS Credits:

10 ECTS credits / 267 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 3 rd year. BS and ECO: scientific writing and Introduction to information retrieval autumn, workshop spring.

TEA: scientific writing, Introduction to information retrieval and workshop autumn

Learning outcomes:

B.Sc. seminar: Student will know the technical and ethical principles of scientific writing and publishing. She/he has the capability to make a scientific review (BSc thesis) and present it clearly as a poster or an oral presentation. *B.Sc. thesis:* Student is able to plan and write up thesis by getting acquainted to an interesting biology subject and reviewing it critically with the help of relevant scientific source material.

Contents:

Independent research work on a scientific subject in agreement with the responsible professor and under the supervision of the degree programme. The supervisors may be professors of the department, docents and other teachers and researchers who have the docent's status. The student may have several supervisors, the other supervisor may be from other department, university (also abroad) or from research institute. The subject must be agreed on with the professor in advance. The research work can contain fieldwork, laboratory work, theoretical work or work on collections in museum. The work always includes a literature survey. After having completed the thesis, the student writes the Maturity Exam. The dean will order the examiners by the proposal of the professor. Pro gradu working group accepts and grades the thesis on the basis of the examiners' opinions.

List of the actual B.Sc. thesis topics is on Noppa.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

BSc seminar: Info lectures, computer exercises, group and peer support, seminar or poster presentation. BSc thesis: About 15 pages long thesis.

Target group:

Compulsory to the biology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

Done at the same time as B.Sc. seminar workshop in spring, subject teacher students have seminar workshop in the autumn.

Recommended or required reading:

-

Assessment methods and criteria:*B.Sc. seminar:* Tutorial group and presentation. *B.Sc. thesis:* Thesis.Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

Pass / Fail.

Person responsible:

B.Sc. seminar: Doc. Seppo Rytönen. *B.Sc. thesis:* Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

750373A: Biogeography, 5 op

Voimassaolo: 01.08.2015 - 31.07.2019

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kvist, Laura Irmeli, Jari-Heikki Oksanen

Opintokohteen kielet: Finnish

Leikkaavuudet:

750173P	Biogeography	5.0 op
750363A	Biogeography	4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 1st autumn.

Learning outcomes:

The course introduces students to basic concepts of biogeography, patterns of distribution and historical and present factors affecting the distribution. Plant biogeography introduces students to modern and historical factors controlling the plant cover, and to the special methods of vegetation science.

Contents:

The course consists of general part and optional part on plant biogeography and vegetation science. The general part introduces basic models and theories of distribution of organisms in the environment. Historical, evolutionary, geographical, climatic and ecological explanations. Research methods used in biogeography. The part on plant biogeography and vegetation science introduces methods on factors controlling the structure and composition of vegetation, and describes major vegetation types in Finland and principal biomes in the World. Methods of vegetation science are briefly surveyed.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

General biogeography: 24 h lectures, independent work (3 cr), **Plant biogeography:** 24 h lectures (2 cr); two exams.

Target group:

Compulsory for biology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

Other recommended courses related to the field: Basics of Ecology (750124P), Evolution and systematics of organisms (750372A), Evolution, systematics and morphology of organisms, practicals (750374A), Biodiversity in human changed environments (755631S).

Recommended or required reading:

Cox, C.B. & Moore, P.D. 2005: Biogeography. An ecological and evolutionary approach (7 ed.), Blackwell Publishing Ltd, or Cox, C.B. & Moore, P.D. 2010: Biogeography. An ecological and evolutionary approach (8 ed.), John Wiley & Sons Inc.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Two exams.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail. Final grade is average value of the two exams.

Person responsible:

Doc. Laura Kvist and Prof. Jari Oksanen.

Working life cooperation:

No.

Other information:

-

755320A: Developmental biology-histology, lectures, 5 op**Voimassaolo:** 01.08.2015 -**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Field of Biology**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

751367A Developmental biology-histology, lectures 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 1 st spring.

Learning outcomes:

After completing the developmental biology -part of the course the student is able to name the most important events of embryonic development and the structural changes related to them. The student is also able to describe the principles gene regulation related to embryonic development. After completing the histology-part of the course the student is able to describe the various tissue types and the microscopic structure of important organs and is also able to identify tissue types and organs from microscopic sections.

Contents:

Motto: "It is not birth, marriage, or death, but gastrulation, which is truly the most important time in your life." (Lewis Wolpert, 1986). Developmental biology will cover gametogenesis, fertilization, forming of embryonic tissue layers (gastrulation), embryonic induction, signal molecules and the differentiation of the most important tissues and organs (organogenesis). Histology will first cover various tissue types, their cell types and matrix composition. Thereafter, the microscopic structure and tissue composition of various organs and organ systems will be covered. In both parts, practical exercises on drawing from microscopic slides (see 755317A) will support lectures.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

38 h lectures and two exams.

Target group:

Compulsory to biology students.

Prerequisites and co-requisites:

Cell biology (750121P) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Lecture notes, lecture handouts. Recommended reading: Sariola, Frilander ym., Solusta yksilöksi: Kehitysbiologia, Duodecim, Helsinki 2003; Gilbert: Developmental Biology, Sinauer Press, 6.ed. 2000, or newer; Young & Heath: Wheater's Functional Histology, Churchill Livingstone, 4. ed. 2000, or newer. The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:2 lecture exams. Read more about [assessment criteria](#) at the University of Oulu webpage.Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

1-5 / Fail.

Person responsible:

MSc Henrika Honkanen.

Working life cooperation:

No.

Other information:

-

750372A: Evolution and systematics of organisms, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Marko Mutanen, Annamari Markkola, Jari-Heikki Oksanen

Opintokohteen kielet: Finnish

Leikkaavuudet:

750307A Evolution and systematics of organisms 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 2nd autumn.

Learning outcomes:

Students will learn a general picture of the diversity of life-forms as to understand the evolutionary history of organisms.

Contents:

The course provides an insight into the biological evolution and evolutionary processes reflected by the systematic classification of the organisms. Also basic principles and concepts of systematics and classification are presented.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

30 h lectures.

Target group:

Compulsory to the biology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

Lectures give basic ability to different biology subjects.

Recommended or required reading:

Net material and supplementary reading: Bell, P.R. & Helmsley, A.R. 2000: Green Plants. Their origin and diversity. 2nd ed. Cambridge University Press., Willis, K.J. & McElwain, J.C. 2002: The evolution of plants. Oxford University Press. Hickman, C. P. et al. 2009. Animal Diversity, 5th edition, McGraw Hill New York.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Lecture exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Arja Kaitala, Prof. Jari Oksanen and Doc. Annamari Markkola.

Working life cooperation:

No.

Other information:

-

755333A: Identification of animals, 6 op

Voimassaolo: 01.08.2016 - 31.07.2019

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Koivula

Opintokohteen kielet: Finnish

Leikkaavuudet:

755334A Identification of animals, vertebrates 4.0 op

ECTS Credits:

6 ECTS credits / 162 hours of work.

Language of instruction:

Finnish / English

Timing:

B.Sc. degree 1st autumn and spring.

Learning outcomes:

Main point of the course is to learn to identify Finnish animal species (vertebrate) and families (invertebrate) from museum samples. Basics of species' ecology and classification of organisms.

Contents:

During the autumn semester (9 h lectures in Finnish, 16 h exercises, exam), the Finnish vertebrate fauna is studied using stuffed museum samples. In the spring semester (9 h lectures in Finnish, 16 h exercises, exam) the invertebrate taxons (mostly family- or genus-level) common in Finland are studied using museum samples.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

18 h lectures in Finnish, 32 h exercises, independent studying, 2 exams.

Target group:

Biology students: compulsory.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

This course is needed for attending courses Field course in terrestrial animals (755322A) and Field course in aquatic animals (755321A).

Recommended or required reading:

Course handouts, Itämies J. ja Viro P. 1995: Eläinten lajintuntemus, selkärangattomat, 73 p.; Putaala, A., Marjakangas, A. & Rytönen, S. 2001: Eläinten lajintuntemus, selkärangaiset, 42 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Two species exams.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Kari Koivula.

Working life cooperation:

No.

Other information:

-

Compulsory

755333A-01: Basic identification of animals, vertebrate, 0 op

Voimassaolo: 01.08.2016 - 31.07.2019

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Pudas, Tuula Kaarina, Kari Koivula

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

755333A-02: Basic identification of animals, invertebrate, 0 op**Voimassaolo:** 01.08.2016 - 31.07.2019**Opiskelumuoto:** Intermediate Studies**Laji:** Partial credit**Vastuuyksikkö:** Field of Biology**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Marko Mutanen**Opintokohteen kielet:** Finnish

Ei opintojaksokuvauksia.

756342A: Identification of plant species, 3 - 4 op**Voimassaolo:** 01.08.2015 - 31.07.2017**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Field of Biology**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Annamari Markkola**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

756355A Identification of plant species, brief 3.0 op

750303A Nature conservation and land use 3.0 op

ECTS Credits:

3-4 ECTS credits / 80-107 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 1st autumn. ECOGEN 1st autumn.

Learning outcomes:

Student is able to identify most common boreal plant species in herbarium specimens.

Contents:

Demonstrations (16 h) and/or independent study of ca. 350 vascular plants, mosses and lichens in the boreal vegetation zone. 3 cr. without the literature in the exam and 2 cr. with the literature in the exam. In the identification exam student has to know specimens scientific name and family in latin.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Demonstrations (16 h) and/or independent study of ca. 350 vascular plants, mosses and lichens in the boreal vegetation zone. 4 cr without the literature in the exam and 3 cr with the literature in the exam. In the identification exam student has to know specimens scientific name and family in latin.

Target group:

4 cr compulsory to TEA and ECO; 3 cr compulsory to BS.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

Course is prerequisite for the Field course in ecological botany (756343A) and for the advanced plant species identification courses.

Recommended or required reading:

Laitinen et al. 2012: Field course in ecological botany; Hanhela, P. & Halonen, P. 1995: Plant identification; Huttunen, A: 1995: Introduction to forest types; Euroola, S., Hicks, S. and Kaakinen, H. 1994: Key to Finnish mire types, pp. 12-117 in: Moore, P. D. (ed.), 1994 European mires, London Academic Press, London, 367 p.

The availability of the literature can be checked from [this link](#).**Assessment methods and criteria:**

Species exam. 4 cr without the literature and 3 cr with the help of the literature.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Annamari Markkola.

Working life cooperation:

No.

Other information:

-

756346A: Plant biology lectures, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Anna-Maria Pirttilä, Häggman, Hely Margaretha

Opintokohteen kielet: Finnish

Leikkaavuudet:

752345A Basics of functional plant biology, lectures 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 2nd spring.

Learning outcomes:

The student can understand and explain the function and regulation of plant cells, tissues and entire plants.

Contents:

The most important phenomena of plant life, like photosynthesis, nitrogen metabolism and plant hormones are discussed.

Mode of delivery:

Face-to-face teaching, book exam.

Learning activities and teaching methods:

Lectures (20 h) and exams.

Target group:

Compulsory to the biology students.

Prerequisites and co-requisites:

Cell biology (750121P) or equivalent knowledge helps in following this course. This course is a prerequisite for course Plant biology practicals (756341A) and Advanced course in plant biology (752682S).

Recommended optional programme components:

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Recommended or required reading:

Taiz, L. et al. 2015. Plant Physiology and Development. Sixth Edition. 761 p. Sinauer Associates, Inc. ISBN-9781605352558.

Terävä, E. & Kanervo, E. 2008: Kasvianatomia or equivalent.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Lectures, book, exams.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Hely Häggman and Doc. Anna Maria Pirttilä.

Working life cooperation:

No.

Other information:

-

755321A: Field course in aquatic animals, 5 op**Voimassaolo:** 01.08.2015 -**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Field of Biology**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Muotka, Timo Tapani, Kaisa-Leena Huttunen**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

751307A Field course in aquatic animals 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 1st summer. ECOGEN 1st summer.

Learning outcomes:

To learn basic methods in biological freshwater sampling and to identify the most common freshwater taxa.

Contents:

Basics of freshwater ecology. Demonstrations of the most frequently-used biological sampling methods. Identification of the most common freshwater fishes, invertebrates and zooplankton.

Mode of delivery:

Face-to-face teaching and independent studying.

Learning activities and teaching methods:

Summer: 50 h of field work and demonstrations at the Oulanka research station, 83 h of independent studying including a reading package.

Target group:

Compulsory (5 cr) to ECO. TEAeco: either Field course in aquatic animals 5 cr (755321A) or Field course in terrestrial animals 5 cr (755322A) is compulsory for biology major, the other field course can be included to the ecology minor. TEAbs, alternatively compulsory to TEAbs either Field course in aquatic animals 5 cr or Field course in terrestrial animals 5 cr. TEA: at least 10 cr compulsory, two field courses, one animal and other botany field course (756343A).

Prerequisites and co-requisites:

Basic identification of animals (755333A) or equivalent knowledge (if necessary, selection to the course 755321A can be based on success in course 755333A).

Recommended optional programme components:

This course is a prerequisite for the following: Winter ecology and physiology (750377A), Special course in aquatic invertebrates (754627S), Assessment and monitoring of the ecological status of water bodies (754625S), Field methods in freshwater biomonitoring (754626S).

Recommended or required reading:

Reading package, handouts and lectures given before / during the course.

Assessment methods and criteria:

On the final course day species identification exam on the species met during the course, practical exam on the sampling methods and

theoretical exam based on the literature and demonstration material.

Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

1-5 / Fail.

Person responsible:

Prof. Timo Muotka.

Working life cooperation:

No.

Other information:

-

755322A: Field course in terrestrial animals, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Seppo Rytkönen

Opintokohteen kielet: Finnish

Leikkaavuudet:

751306A Field course in terrestrial animals 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. - 1st summer. ECOGEN 1st summer.

Learning outcomes:

The aim of the course is to learn the basics of field identification and ecology of terrestrial animals in northern Finland. The student will understand that proper skills in species identification and knowledge of species' ecology are the basis of ecological research.

Contents:

The fauna in different kinds of terrestrial habitats is studied using several ecological sampling and research methods. The course is held at the Oulanka Research Station, Kuusamo, and deals with identification and ecology of invertebrates, mammals (especially small mammals), gallinaceous birds and birds of prey. The exercises take place partly in the field and partly in the laboratory. Data gained during the course is analyzed. The results are reported (in PowerPoint) and presented in the final seminar in Kuusamo.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Part 1. (Oulu): 2 h demonstration, independent studying. Part 2. (Oulanka): 49 h demonstrations and practicals, one species and theory exam, seminar.

Target group:

Compulsory (5 cr) to ECO. TEAeco: either Field course in aquatic animals 5 cr (755321A) or Field course in terrestrial animals 5 cr (755322A) is compulsory for biology major, the other field course can be included to the ecology minor. TEAbs, alternatively compulsory to TEAbs either Field course in aquatic animals 5 cr or Field course in terrestrial animals 5 cr. TEA: at least 10 cr compulsory, two field courses, one animal and other botany field course (756343A).

Prerequisites and co-requisites:

Basic identification of animals (755333A) or equivalent knowledge.

Recommended optional programme components:

This course is a prerequisite to course Winter ecology and physiology (750377A).

Recommended or required reading:

Compulsory at Oulanka: 1) Rytkönen, S. ym. 2003: 751306 Maaeläimistön tuntemus ja ekologia. - Biologian laitoksen monisteita 3/2003. Oulun yliopisto, Oulu. 2) Pentinsaari, M. ym. 2015: Eläinten lajintuntemus, selkärangattomat. Oulun yliopisto, Oulu. Insect book recommended: Chinery, M. 1988 Pohjois-Euroopan hyönteisheimojen määrittäysopas, Tammi, Helsinki, 2. painos.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Theory exam, species identification exam, seminar presentation.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Seppo Rytkönen.

Working life cooperation:

No.

Other information:

Binoculars, bird identification book, suitable outfit. Preparation knife, preparation scissors and sharp cusp tweezers.

756343A: Field course in ecological botany, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Annamari Markkola

Opintokohteen kielet: Finnish

Leikkaavuudet:

752304A Field course in ecological botany 5.0 op

ECTS Credits:

5 cr / 133 h of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 1st summer. ECOGEN 1st summer.

Learning outcomes:

Student is able to identify most common boreal plant species in the field, to plan and conduct ecological field experiments and use basic methods in vegetation analyses.

Contents:

Vegetation in the coast of Bothnian Bay in Hailuoto and/or Oulu (3 days). Basics of boreal forest and mire vegetation classification and types at Oulanka Research Station (7 days). Vegetation research and basic methods of stock estimation. Mire vegetation development and ecological biodiversity.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures 10 h, field demonstrations and laboratory exercises, excursions 84 hours in Oulu and/or Hailuoto and Oulanka Research Station. Field exams for plant identification and mire ecology, report.

Target group:

B.Sc. Compulsory to ECO 5 cr and TEA 5 cp, TEA: at least 10 cr compulsory, two field courses, one ecological botany field course (756343A) and other animal field course (either 755321 or 755322A).

Prerequisites and co-requisites:

Identification of plant species (756354A) 5 cr or equivalent knowledge.

Recommended optional programme components:

Course has capacity for 32 or 40 students. Possible elimination of the candidates is done by study success and Plant identification (756354A) grade. This course is a prerequisite for courses Plant ecology (752600S), Mire ecology (752692S) and Field course in Arctic-Alpine ecology and vegetation (752642S).

Recommended or required reading:

Laitinen et al. 2012: Field course in ecological botany; Hanhela, P. & Halonen, P. 1995: Plant identification; Huttunen, A: 1995: Introduction to forest types; Euroala, S., Hicks, S. and Kaakinen, H. 1994: Key to Finnish mire types, pp. 12-117 in: Moore, P. D. (ed.), 1994 European mires, London Academic Press, London, 367 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Field exams, report.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

doc. Annamari Markkola.

Working life cooperation:

Essential working life skills are learned during the field course.

Other information:

-

751366A: Animal behaviour, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kaitala Arja

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 3rd spring or M.Sc. 1st spring ECOz.

Learning outcomes:

To understand basic principles of animal behaviour in an evolutionary ecology contest.

Contents:

The basics of behavioural ecology of animals. Lecture topics: Animal foraging, predator-pray interactions, mating systems, and social behaviour. Seminars are based on the latest research results.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

30 h lectures, seminars, exam.

Target group:

B.Sc. degree optional to ECO, M.Sc. degree compulsory to ECOz.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Davis, NB, Krebs, JR, & West, SA N.B. (2012) An Introduction to Behavioural Ecology, 4th ed, Wiley-Blackwell.

The availability of the literature can be checked from [this link](#)

Assessment methods and criteria:

Seminar and exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Arja Kaitala.

Working life cooperation:

No.

Other information:

-

756351A: Basics in population ecology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kvist, Laura Irmeli, Orell, Markku Ilmari

Opintokohteen kielet: Finnish

Leikkaavuudet:

755336A Population ecology 10.0 op

756323A Population biology of plants 5.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 3rd autumn.

Learning outcomes:

Basic skills in methods of population biology.

Contents:

Demography and life history strategies with emphasis on dynamics of structured populations in space and time, with an emphasis on conservation biology. Usage of matrix models to calculate basic population parameters and analyze population viability. Metapopulation dynamics and ecological and evolutionary genetics and interactions between populations and their environment are addressed. In exercises, dynamics of populations are analysed with matrix models and simulation programs.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

32 h lectures, 18 h computer exercises, seminar.

Target group:

ECO: compulsory.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Silvertown & Charlesworth 2001: Introduction to Plant Population Biology (4 th edition), Blackwell Science.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Exam.

Grading:

1-5 / Fail.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Person responsible:

Doc. Laura Kvist

Working life cooperation:

No.

Other information:

-

756348A: Ecological responses to global change and air pollution in the subarctic, 5 - 8 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Taulavuori

Opintokohteen kielet: Finnish

Leikkaavuudet:

750343A Ecological responses to global change and air pollution in the subarctic 4.0 op

ECTS Credits:

5 (- 8) cr / 133 (- 240) hours of work.

Language of instruction:

Finnish / English.

Timing:

B. Sc. / M. Sc. / Ph.D. Field excursion is arranged if resources allow.

Learning outcomes:

Student can identify the ecological and environmental effects of climate change and air pollution in the subarctic area. In addition, the student may learn basic research methods related to topic, and how to use the facilities provided by the subarctic research stations in the research.

Contents:

Lectures deal the ecological responses of global change and air pollution. The content is focused on the environmental effects and their ecological significance in the northern areas. During excursion the student familiarizes with the special features of northern areas and explores the action and research carried out in the northern research stations.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

(1) 24 h lectures with exam, and 15 h independent studies (essay and seminar work) (4 cr); (2) 4-5 days summer excursion and closing seminar (3 cr); participation in excursion necessitates accepted credits in the first part (lectures, independent studies).

Target group:

Ecology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-ACIA (2005) Arctic Climate Impact Assessment, Cambridge University Press, 1042 p. -AMAP Assessment 2006: Acidifying Pollutants, Arctic Haze, and Acidification in the Arctic. Arctic Monitoring and Assessment Programme (AMAP), Oslo, Norway. Xii + 112pp. Bell JNB & Trehov M (eds.) 2002. Air pollution and plant life. Wiley. 2nd edition. 480 pages.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Lectures, essay and seminar, excursion, closing report and seminar.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail

Person responsible:

Doc. Kari Taulavuori.

Working life cooperation:

Possible excursion will include tours to the northern research stations.

Other information:

Field excursion is arranged if resources allow.

750374A: Evolution, systematics and morphology of organisms, 3 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Annamari Markkola, Sami Kivelä

Opintokohteen kielet: Finnish

Leikkaavuudet:

755312A Evolution, systematics and morphology of animals, practicals 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. degree 2. autumn.

Learning outcomes:

Main aim of the course is to learn evolutionary history of organisms and basics of systematics: how the life has evolved and which evolutionary processes have affected the development. Students will get an idea, how and why different or similar morphological traits and functions have evolved in different taxonomic groups.

Contents:

Morphology and anatomy of macro- and microscopic specimens of different taxonomic groups are studied by the students in systematic order from microbes to plants and invertebrate and vertebrate animals. Demonstrations

connect the morphological traits of studied specimens and organism groups to a wider evolutionary context and illustrate the importance of different structures for the organisms in their living environment.

Mode of delivery:

Face-to face teaching.

Learning activities and teaching methods:

36 h compulsory exercises and demonstrations, exercise exam.

Target group:

BSc, ECO and BS: compulsory, TEA: optional.

Prerequisites and co-requisites:

Evolution and systematics of organisms (750372A).

Recommended optional programme components:

-

Recommended or required reading:

Course handouts can be bought from the teachers before the course starts. Net material and books Bell, P.R. & Hemsley, A.R. 2000. Green plants. Their origin and diversity. 2 nd edn. Cambridge University Press. Willis, K.J. & McElwain, J.C. 2002: The evolution of plants. Oxford University Press. Rikkinen, J. 1999: Leviä, sieniä ja leväsieniä, johdatus levien ja sienten monimuotoisuuteen. Yliopistopaino, Helsinki. 194 s. Hickman, C, P. et al. 2009. Animal Diversity, 5. painos, McGraw Hill New York.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Annamari Markkola.

Working life cooperation:

No

Other information:

-

750336A: Evolutionary ecology, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Sami Kivelä

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / (English).

Timing:

B.Sc. degree 2nd autumn.

Learning outcomes:

To understand main principles of evolution and the concepts of natural selection, fitness and adaptation. Learn basics of life-history adaptation, speciation processes and social evolution.

Contents:

The aim of the course is to introduce a student with lectures and seminars to the main topics of evolutionary ecology, for example basic concepts of natural selection and evolution, selection level, speciation, evolution of life cycles, interactions between and within species are included. Review to the latest research results.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

36 h lectures and compulsory seminars, exam.

Target group:

BS and ECO compulsory, TEAeco optional.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Additional reading: Björklund, Mats 2009 Evoluutiobiologia. Gaudeamus, Sterans, S. and Hoekstra, R. F. 2005: Evolution, An Introduction. Oxford University Press, New York, 575 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Seminar and exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Arja Kaitala.

Working life cooperation:

No.

Other information:

-

755321A: Field course in aquatic animals, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Muotka, Timo Tapani, Kaisa-Leena Huttunen

Opintokohteen kielet: Finnish

Leikkaavuudet:

751307A Field course in aquatic animals 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 1st summer. ECOGEN 1st summer.

Learning outcomes:

To learn basic methods in biological freshwater sampling and to identify the most common freshwater taxa.

Contents:

Basics of freshwater ecology. Demonstrations of the most frequently-used biological sampling methods. Identification of the most common freshwater fishes, invertebrates and zooplankton.

Mode of delivery:

Face-to-face teaching and independent studying.

Learning activities and teaching methods:

Summer: 50 h of field work and demonstrations at the Oulanka research station, 83 h of independent studying including a reading package.

Target group:

Compulsory (5 cr) to ECO. TEAeco: either Field course in aquatic animals 5 cr (755321A) or Field course in terrestrial animals 5 cr (755322A) is compulsory for biology major, the other field course can be included to the ecology minor. TEAbs, alternatively compulsory to TEAbs either Field course in aquatic animals 5 cr or Field course in terrestrial animals 5 cr. TEA: at least 10 cr compulsory, two field courses, one animal and other botany field course (756343A).

Prerequisites and co-requisites:

Basic identification of animals (755333A) or equivalent knowledge (if necessary, selection to the course 755321A can be based on success in course 755333A).

Recommended optional programme components:

This course is a prerequisite for the following: Winter ecology and physiology (750377A), Special course in aquatic invertebrates (754627S), Assessment and monitoring of the ecological status of water bodies (754625S), Field methods in freshwater biomonitoring (754626S).

Recommended or required reading:

Reading package, handouts and lectures given before / during the course.

Assessment methods and criteria:

On the final course day species identification exam on the species met during the course, practical exam on the sampling methods and

theoretical exam based on the literature and demonstration material.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Timo Muotka.

Working life cooperation:

No.

Other information:

-

755322A: Field course in terrestrial animals, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Seppo Rytkönen

Opintokohteen kielet: Finnish

Leikkaavuudet:

751306A Field course in terrestrial animals 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. - 1st summer. ECOGEN 1st summer.

Learning outcomes:

The aim of the course is to learn the basics of field identification and ecology of terrestrial animals in northern Finland. The student will understand that proper skills in species identification and knowledge of species' ecology are the basis of ecological research.

Contents:

The fauna in different kinds of terrestrial habitats is studied using several ecological sampling and research methods. The course is held at the Oulanka Research Station, Kuusamo, and deals with identification and ecology of invertebrates, mammals (especially small mammals), gallinaceous birds and birds of prey. The exercises take place partly in the field and partly in the laboratory. Data gained during the course is analyzed. The results are reported (in PowerPoint) and presented in the final seminar in Kuusamo.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Part 1. (Oulu): 2 h demonstration, independent studying. Part 2. (Oulanka): 49 h demonstrations and practicals, one species and theory exam, seminar.

Target group:

Compulsory (5 cr) to ECO. TEAeco: either Field course in aquatic animals 5 cr (755321A) or Field course in terrestrial animals 5 cr (755322A) is compulsory for biology major, the other field course can be included to the ecology minor. TEAbs, alternatively compulsory to TEAbs either Field course in aquatic animals 5 cr or Field course in terrestrial animals 5 cr. TEA: at least 10 cr compulsory, two field courses, one animal and other botany field course (756343A).

Prerequisites and co-requisites:

Basic identification of animals (755333A) or equivalent knowledge.

Recommended optional programme components:

This course is a prerequisite to course Winter ecology and physiology (750377A).

Recommended or required reading:

Compulsory at Oulanka: 1) Rytönen, S. ym. 2003: 751306 Maaeläimistön tuntemus ja ekologia. - Biologian laitoksen monisteita 3/2003. Oulun yliopisto, Oulu. 2) Pentinsaari, M. ym. 2015: Eläinten lajintuntemus, selkärangattomat. Oulun yliopisto, Oulu. Insect book recommended: Chinery, M. 1988 Pohjois-Euroopan hyönteisheimojen määrittäminen, Tammi, Helsinki, 2. painos.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Theory exam, species identification exam, seminar presentation.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Seppo Rytönen.

Working life cooperation:

No.

Other information:

Binoculars, bird identification book, suitable outfit. Preparation knife, preparation scissors and sharp cusp tweezers.

755313A: Field identification of birds, 1 - 5 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Seppo Rytönen

Opintokohteen kielet: Finnish

ECTS Credits:

2 ECTS credits / 53 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 1 st summer.

Learning outcomes:

The aim of the course is to get a basic level of field identification of Finnish birds.

Contents:

The student will learn the basics of avian field identification by familiarizing him/herself with the local bird fauna in different biotopes. The method is self-learning with keeping a notebook of the field observations.

Learning activities and teaching methods:

Blended teaching.

Target group:

ECO optional.

Prerequisites and co-requisites:

Basic identification of animals (755333A) or equivalent knowledge.

Recommended optional programme components:

Optional addition to course Field course in terrestrial animals (755322A).

Recommended or required reading:

Additional information and material: wiki oulu.fi à Animal ecology à Teaching à Field identification of birds.

Assessment methods and criteria:

Notebook of field observations.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Accepted / Failed.

Person responsible:

Doc. Seppo Rytönen.

Working life cooperation:

No.

Other information:

-

755324A: Functional animal ecology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Seppo Rytkönen

Opintokohteen kielet: Finnish

Leikkaavuudet:

751378A Functional animal ecology 6.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Lectures in Finnish, exercises in Finnish / English.

Timing:

B.Sc. 2nd spring or M.Sc. 1st spring. NNE.

Learning outcomes:

The aim of the course is to understand the relationship between morphology and function by the means of general ecomorphological model. The student will get both theoretical and practical basics for ecomorphological (and. general scientific) research procedures: scientific hypothesizing, sampling, data analysis and reporting and interpreting the results.

Contents:

The course focuses on the relationship between phenotype and function, especially the correlation between animal morphology and behaviour. The course consists of two parts: A) Lectures in Finnish. However, articles about each subject are available for foreign students, including ecomorphological models and correlations, measurement error, allometry, fluctuating asymmetry and phylogenetic analyses. B) Exercises consisting of miniature studies, field and laboratory work, and seminar. The results of the mini studies, in form of PowerPoint presentations, are presented in the seminar. Before the exercises, students write a home essay (or take an exam).

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

12 h lectures, 40 h exercises, seminar and essay (or exam).

Target group:

Recommended for ecology students.

Prerequisites and co-requisites:

Recommended Evolution, systematics and morphology of animals, practicals (750374A), Introduction to statistics 5 cr (806118P) and A second course in statistics 5 cr (806119P).

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Essay or exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Seppo Rytkönen.

Working life cooperation:

No.

Other information:

-

754322A: Introduction to hydrobiology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Muotka, Timo Tapani

Opintokohteen kielet: Finnish

Leikkaavuudet:

754308A Introduction to hydrobiology 3.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 3rd spring, M.Sc. 1st spring. Even numbered years.

Learning outcomes:

Basic knowledge of inland water ecosystems structure, function and organisms. Basic concepts of hydrobiology which are necessary for further hydrobiology studies.

Contents:

Hydrography and physical and chemical properties of lakes and streams. Structure and ecological interactions of aquatic ecosystems (bacteria, plant and animal plankton, water insects, other invertebrates, fishes). Most important biological interactions (competition, predation, parasitism, mutualism), inland water food web structure and regulation. Biodiversity of inland waters. Human influence on inland water biodiversity and ecosystem functions.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

26 h lectures, final exam.

Target group:

ECO, TEA.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

Lectures are compulsory to the students taking the hydrobiology study package.

Recommended or required reading:

Course material and book Brönmark, C. & Hansson, L. 2005: The Biology of Lakes and Ponds. Oxford University Press, 285 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Timo Muotka.

Working life cooperation:

No.

Other information:

-

755325A: Methods in ecology I, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Koivula

Opintokohteen kielet: Finnish

Leikkaavuudet:

750347A Ecological methods I 6.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 3 rd autumn, ECOGEN 1st autumn.

Learning outcomes:

Students are familiar to scientific method and can separate scientific information from other contents of culture. Students have learned to assess the uncertainty of information and can evaluate the quality of information with respect to its applied value. Students also learn the build a valid theoretical or empirical strategy to solve scientific problems.

Contents:

The aim of the course is to introduce the students in scientific modes of argumentation and research methods in modern ecology. Both the empirical and theoretical methods and their relationship in theory formation are discussed. Hypothesis testing; observational method, experimental method and comparative method are the empirical methods introduced. Autumn period ends in a seminar where scientific publications are analysed.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures, seminar, exercises and exam.

Target group:

Compulsory to ECO.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Kari Koivula, Doc. Seppo Rytkönen and Prof. Markku Orell.

Working life cooperation:

No.

Other information:

-

755329A: Methods in ecology II, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Seppo Rytkönen, Jari-Heikki Oksanen

Opintokohteen kielet: Finnish

Leikkaavuudet:

750647S Methods in ecology II 7.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Lectures Finnish / English, exercises also in English.

Timing:

Finnish B.Sc. 3rd spring, ECOGEN ECO 1st spring.

Learning outcomes:

The aim of the course is to learn in practice how to apply scientific method in ecological research. The student learns how to select appropriate methods for different ecological problems, and a toolkit for study design and data analysis.

Contents:

Continuation to course Ecological methods I 5cr (755325A, 755625S). This course focuses on applying the scientific method in ecological research. The course consists mainly of computer exercises in the following subjects: sampling, sample size determination, experimental design and statistical analysis esp. analysis of variance, comparative methods (independent contrasts - analysis), multivariate methods (cluster analysis, ordination) and meta-analysis. Also other current issues can be included.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures 8 h, 40 h exercises, independent work and exam.

Target group:

ECOGEN ECO compulsory.

Prerequisites and co-requisites:

Course Ecological methods I 5 cr (755325A). Recommended: Introduction to Statistics 5 cr (806118P) and A second course in statistics 5 cr (806119P).

Recommended optional programme components:

-

Recommended or required reading:

Reading package at course wiki-pages.

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Seppo Rytönen and Prof. Jari Oksanen.

Working life cooperation:

No.

Other information:

-

756344A: Plant ecology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Taulavuori, Annamari Markkola

Opintokohteen kielet: Finnish

Leikkaavuudet:

752300A Plant ecology 7.0 op

ECTS Credits:

5 cr / 133 hours of work.

Language of instruction:

Lectures Finnish, Exercises Finnish / English.

Timing:

B.Sc. 2nd autumn. ECOGEN 1st autumn.

Learning outcomes:

Student will get basic knowledge how plants adapt to different environmental factors.

Contents:

The main subject of this course is the heterogeneity of environment and the capacity of plants to adapt flexibly to different light and nutrient conditions. For carbon economy the main questions are variation in photosynthetic potential, extrinsic factors which restrict the photosynthesis and the structural and physiological adaptations to different light conditions. Nutrient economy is not only dependent on the soil of the habitat but also on the capacity of plant to change the ions from the surface of soil particles. Symbiosis has a great importance on nutrient economy of boreal plants. The balance between benefits and costs defines whether the symbiosis with the nitrogen fixation bacteria or with mycorrhizal fungi is beneficial for the plant or not. There is competition between plants for soil nutrients and for light. How is it possible that plants competing for the same basic nutrients can live in the same habitat? Isn't the niche theory valid for plants?

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

(1) 24 h lectures and exam; (2) 10 h seminars on the literature of plant ecology; (3) 30 h demonstrations and exercises in field and laboratory (basic methods in plant ecology and laboratory work) and 4 h final seminars. International students will compensate lectures by reading book Ridge, I. 2002: Plants, Oxford Univ. Press.

Target group:

Compulsory to ECO.

Prerequisites and co-requisites:

Basics of ecology (750124P) and Field course in ecological botany (756343A) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Ridge, I. 2002: Plants.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Lecture exam, laboratory diary and seminar presentation.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Kari Taulavuori ja doc. Annamari Markkola (lectures), Kari Taulavuori (exercises).

Working life cooperation:

No.

Other information:

-

756304A: Plant ecophysiology in changing environments, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Taulavuori

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 3rd or M.Sc. 1st spring.

Learning outcomes:

After finishing the course student understands interactions between plant and environment, and has become acquainted to most important experimental methods in physiological plant ecology and student can apply research parameters. Student can apply the knowledge to plant production and environmental protection issues.

Contents:

The aim of the course is to initiate the students into the basics of plant ecophysiology in changing environments. The physical, chemical (abiotic) and biotic factors in the environment affects plant's growth and survival. Plant ecophysiology is an experimental science, which studies the physiological functions and adjustments underlining the

ecological observations from the viewpoint of growth and survival. Different environmental stresses restrict the plant growth. Plant ecophysiology is experimental science which studies the physiological functions and regulation mechanisms on growth, survival, abundance and distribution. Effects of abiotic and biotic factors are studied. How elevated temperature, CO₂, drought stress, nutrient imbalance, air pollutants, metals, UV radiation and plant pathogens affect on plants' gas exchange, primary metabolism, carbon allocation and growth. The exercises can also focus on the effects of environmental factors on photosynthesis, respiration, transport of photosynthetic products, water economy, energy economy and nutrient economy. Special features of ecophysiology of boreal plants are also dealt with.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

20 h lectures and demonstrations, 35 h exercises, exam, report, seminar.

Target group:

ECOb, BSb, Ph.D. students (if not in the undergraduate degree).

Prerequisites and co-requisites:

-

Recommended optional programme components:

Course is related both to plant ecology and plant physiology basic studies.

Recommended or required reading:

Hans Lambers, F.Stuart Chapin III, Thijs L. Pons 2008: Plant Physiological Ecology. Springer Verlag. 540 s. Second edition.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Seminar and report.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Kari Taulavuori.

Working life cooperation:

No.

Other information:

-

750313A: Research training, 2 - 15 op

Opiskelumuoto: Intermediate Studies

Laji: Practical training

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

1-15 ECTS credits / 27-405 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. degree.

Learning outcomes:

Student applies the education given knowledge and skills in working life to gain hands-on experience.

Contents:

Work on special projects in the different biology research groups at the department or elsewhere or independent project work including field and/or laboratory work or work at the biological stations. The work is not included to other study modules in biology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

The topic and the study plan have to be agreed on in advance (registration form). The student has to keep diary and prepare a report on the work.

Target group:

-

Prerequisites and co-requisites:
No.

Recommended optional programme components:
-

Recommended or required reading:
-

Assessment methods and criteria:
Report.
Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:
Pass / Fail.

Person responsible:
Prof. Markku Orell, Prof. Jari Oksanen, Prof. Outi Savolainen and Prof. Hely Häggman.

Working life cooperation:
Yes. Participating to biology project will give working life skills.

Other information:
-

755328A: Wildlife management and game animal ecology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Jouni Aspi, Kari Koivula

Opintokohteen kielet: Finnish

Leikkaavuudet:

751368A Wildlife management and game animal ecology 6.0 op

ECTS Credits:

5 cr / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 3rd autumn or M.Sc. 1st autumn.

Learning outcomes:

After carrying out the study module the student will be able to recognize special ecological traits of the game animals and relate them to the general ecological framework. The student will be also to appraise the basics of durable hunting of game animals. The student will be also able to appraise the basics of durable hunting of game animals and critically judge different wildlife management methods from the scientific starting point.

Contents:

The ecology of game species, their life histories, population dynamics and predator-prey relationships. Hunting ecology: man as predator, management and hunting of the game species. The impact of forestry on the game species' populations. Students are also introduced to wildlife management in practice and to the social aspect of wildlife-human relationship.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

24 h lectures, one-day excursion to a game breeding area, seminar with written reports and exam.

Target group:

-

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Seminar with report and exam.

Grading:

1-5 / Fail.

Person responsible:

Prof. Jouni Aspi ja doc. Kari Koivula.

Working life cooperation:

Yes.

Other information:

-

750377A: Winter ecology and physiology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Taulavuori

Opintokohteen kielet: Finnish

Leikkaavuudet:

750325A Winter ecology and physiology 3.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

English.

Timing:

B.Sc. 3 rd or M.Sc. 1 st spring. NNE.

Learning outcomes:

Student obtains basic knowledge of animal and plant acclimations and adaptations to winter, and can evaluate the effects of cold temperatures and snow on overwintering, and learns central methodology in winter ecology and physiology.

Contents:

Three independent units: 1) Winter ecology and physiology course (7 h lectures and 13 h laboratory practicals and 4 h seminar in Oulu, and 4 day long field excursion to the Oulanka Research Station (total about 50 h, 3 cr); 2) Book exam on a common exam day 2 cr: Marchand, P. J. 1996: Life in the cold. An introduction to winter ecology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures, exercises, report and seminar presentation.

Target group:

Biology students.

Prerequisites and co-requisites:

Courses Basics of ecology (750124P), Field course in ecological botany (752304A), Cell biology (750121P), Field course in terrestrial animals (751306A), Field course in aquatic animals (751307A) and Basics of functional plant biology, lectures (752345A) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Marchand, P. J. 1996: Life in the cold. An introduction to winter ecology. (3rd edition). University Press of New England. 304 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Seminar presentation and book exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Course + seminar: Pass / Fail, book exam: 1-5 / Fail.

Person responsible:

Doc. Kari Taulavuori.

Working life cooperation:

No.

Other information:

-

410067P: Basic course in education, 4 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay410067P Basic course in education (OPEN UNI) 4.0 op

ECTS Credits:

4 credits

Language of instruction:

Finnish or English

Timing:

1st year

Secondary teacher students 3rd year spring term

Learning outcomes:

After completion of the course, the student

- identifies the most important features of education as a science
- has a basic understanding of the history of education and its main areas of study
- knows how to use the basic concepts of education and pedagogy and is familiar with issues connected with them
- can relate different sectors of the educational sciences to each other
- is familiar with practical and professional tasks in the field of education and with issues connected to them.

Contents:

- basic concepts: development, bildung, teaching, pedagogical activity
- the status of scientific and practical theory in education and pedagogy
- education as a science, main areas and subareas
- history and development of education
- basics of professional growth and development
- orientation to practical tasks in education, assumption of a professional identity as a teacher and in other educational tasks.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures and other contact teaching 18 h, independent work 89 h

Target group:

Students in all programmes pursuing Basic Studies in Education

Prerequisites and co-requisites:

None

Recommended optional programme components:

This is the first course in the Basic Studies in Education (25 credits).

Recommended or required reading:

Rinne, R., Kivirauma, J. & Lehtinen, E. (eds.) (2000) Johdatus kasvatustieteisiin.

Siljander, P. (2014 or newer prints) Systemaattinen johdatus kasvatustieteeseen. Peruskäsitteet ja pääsuuntauokset.

Vastapaino.

Availability can be checked [here](#).

Assessment methods and criteria:

Exam or written assignments

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

pass/fail

Person responsible:

Pauli Siljander

Working life cooperation:

None

050081A: Basic teaching practice, 5 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Intermediate Studies**Laji:** Practical training**Vastuuyksikkö:** Faculty of Education**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**ECTS Credits:**

5 cr

Language of instruction:

Finnish

Timing:

3rd year, spring term

Learning outcomes:

- The student identifies that the operation of a school is governed by laws and other standards such as curricula.
- The student is familiarised with the teacher's job and school as a work community.
- The student internalises the wide scope of a teacher's work and working as a guide of learning.
- The student is conscious of the meaning of the curriculum as the basis of teaching in his or her subject and knows how to apply it to his or her teaching.
- The student knows how to plan, implement and evaluate teaching.
- The student applies his/her skills to encounter different learners and to keep in control of teaching situations.

Contents:

- observation and analysis of teaching
- awareness of pupil needs and observation of the working atmosphere
- school laws and the core curriculum
- familiarisation with the teaching plans of the Teacher Training School and the student's own subject
- familiarisation with the practice plan and assessment criteria
- setting personal goals for teaching practice
- planning, implementation and evaluation of teaching
- teaching methods and materials
- development of skills of interaction
- special characteristics of the student's own subject
- individual and group supervision
- educational use of ICT

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Contact teaching 70-75 h, independent work 59-64 h

Target group:

Pedagogical Studies for Secondary Teachers

Prerequisites and co-requisites:

No

Recommended optional programme components:

Pedagogical Studies for Secondary Teachers

Recommended or required reading:

Depends on subject in which the student is practising

Assessment methods and criteria:

Presence teaching, independent work

Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

Pass/fail

Person responsible:

Sari Eskola, Hellevi Kupila and Emilia Manninen

Working life cooperation:

Yes

410068P: Didactics, 4 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay410068P Didactics: (OPEN UNI) 4.0 op

ECTS Credits:

4 credits

Language of instruction:

Finnish or English

Timing:

1st year

Secondary teacher students 3rd year spring term

Learning outcomes:

After completion the students

- understand the basic concepts related to learning and teaching, their theoretical foundations and significance in practice
- understand the learning process and its cognitive, motivational and social features.
- recognize the teacher's role as a director/guider of learning and are familiar with new models of teaching
- are able to analyse the characteristics of a good learner in theory and practice and are aware of how learning skills can be taught.

Contents:

- basic concepts of learning and teaching, their theoretical foundations and significance in practice
- basic processes of learning, their cognitive, motivational and social features
- theoretical foundations of learning guidance: the teacher's role as a director of learning, models of teaching
- principles of curriculum design and planning of teaching entities
- the characteristics of a good learner in theory and in practice: how learning skills can be taught

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures and other contact teaching 18 h, independent studies 89 h

Target group:

Students in all programmes pursuing Basic Studies in Education

Prerequisites and co-requisites:

No

Recommended optional programme components:

The course is part of the Basic Studies in Education (25 cr).

Recommended or required reading:

Applicable parts:

- Hakkarainen, K. , Lonka, K. & Lipponen, L. (2004 or 2001) Tutkiva oppiminen. järki, tunteet ja kulttuuri oppimisen sytyttäjinä.
- and supplementary literature to be announced during the course.

Course material availability can be checked [here](#).

Assessment methods and criteria:

Exam or written assignments

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

pass/fail

Person responsible:

Sanna Järvelä

Outi Toropainen

Working life cooperation:

No

410069P: Educational psychology, 4 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay410069P Educational psychology: (OPEN UNI) 4.0 op

ECTS Credits:

4 credits

Language of instruction:

Finnish

Timing:

1st year

Secondary teacher students 3rd year spring term

Learning outcomes:

Having completed the course, the student

- knows how to use the central concepts and identifies the main research areas and topics in educational psychology
- knows how to analyse the special nature of knowledge on educational psychology and estimate the opportunities and limitations in the application of this knowledge to educational work

Contents:

- the relationship of educational psychology to psychology and other subareas of education
- research object and basic concepts: growth, development and learning
- professional practice in educational psychology and its application to issues of growth and development at different ages

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures and other teaching 18 h, independent studies 89 h

Target group:

Students in all programmes pursuing Basic Studies in Education

Prerequisites and co-requisites:

No

Recommended optional programme components:

The course is part of the Basic Studies in Education (25 cr).

Recommended or required reading:

Applicable parts:

- Lehtinen, E., Kuusinen, J. & Vauras, M. (2007) Kasvatuspsykologia
- Soini (2016 or 2015) Johdatusta kasvatuspsykologian kysymyksiin. Opintomoniste, available in Optima.
- and additional literature to be announced during the course.

Course material availability can be checked [here](#).

Assessment methods and criteria:

Exam or written assignments

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

pass/fail

Person responsible:

Teemu Suorsa

Working life cooperation:

No

050091A: Optional studies, 3 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

3 cr

Language of instruction:

Finnish

Timing:

3. opintovuosi, kevätlukukausi

Learning outcomes:

Having completed the course, the student is able to describe the main contents of the course selected by him/her and apply it in his/her work as a teacher.

Contents:

Permanent and annually alternating courses that support the general goals of the pedagogical studies for teachers, offered by the Teacher Training School, Education and Subject Didactics. The aim is to arrange courses on the following fields, among others: ICT, ethics, problem-based orientation in teaching and as part of the professional identity, civics and active citizenship, environmental responsibility, multi- and interculturalism, encountering dissimilarity, multiprofessional collaboration, functional mathematics etc.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures, other contact teaching and independent work totalling 27-80 h

Target group:

Secondary teacher students

Prerequisites and co-requisites:

No

Recommended optional programme components:

Course is part of the Pedagogical Studies for Secondary Teachers

Recommended or required reading:

Varies depending on the student's choice.

Assessment methods and criteria:

To be agreed on at the start of the course.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass/fail

Person responsible:

Emilia Manninen

Working life cooperation:

No

410083P: Pedagogical seminar, 3 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

3 cr

Language of instruction:

Finnish

Timing:

3rd year, spring term

Learning outcomes:

The student

- constructs a relationship between general education studies and other contents of pedagogical studies and experiences gained in teaching practice (relationship between theory and practice)
- knows how to carry on a pedagogical discussion with the representatives of different subjects and other parties, reflecting on his or her own pedagogical theory-in-use and justifying his/her pedagogical activities
- knows how to encounter different pupils, identify the need for general, enhanced and special support and utilise in his/her work skills of pupil welfare work based on the main principles of inclusive education and the multiprofessional network as an educational and pedagogical resource
- knows the principles of pupil welfare work and the pupil welfare group and is able to make use of them to compose an individual education plan (IEP), for instance

Contents:

- orientation to educational science and its various areas and their meaning as part of a secondary teacher's professional competence
- educational thinking and pedagogical theory-in-use as part of a secondary teacher's professional competence
- orientation to issues related to facing dissimilarity at school as part of a secondary teacher's professional competence

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 8 h, small group sessions 20 h, independent work 22 h

Target group:

Secondary teacher students doing their Bachelor studies

Prerequisites and co-requisites:

None

Recommended optional programme components:

410067P Basic Course in Education

410069P Educational Psychology

410068P Didactics, Subject Didactics I

050081A Basic Practice

Recommended or required reading:

To be agreed on at the start of the course.

Assessment methods and criteria:

Active participation in teaching and practical assignments, written seminar paper

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass/fail

Person responsible:

Marko Kielenen and Markku Salakka

Working life cooperation:

None

902002Y: English 1 (Reading for Academic Purposes), 2 op

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Proficiency level:

B2/C1 on the [Common European Framework of Reference](#) scale.

Status:

This course is mandatory for students of the following degree programmes:

Faculty of Science

•Biology

•Chemistry

•Mathematical Sciences

•Physics

Oulu Mining School

•Geosciences degree programme

Faculty of Information Technology and Electrical Engineering

- Department of Information Processing Science

Students in the Department of Geography take English 3.

Engineering students in the following programmes take their English courses in the Faculty of Technology:

Oulu Mining School:

- Mining Technology and Mineral Processing degree programme

Faculty of Information Technology and Electrical Engineering

- Department of Electrical Engineering
- Department of Communications Engineering
- Department of Computer Science and Engineering

Please consult the Faculty Study Guide to establish the language requirements for your own degree program.

Required proficiency level:

English must have been the A1 or A2 language at school or equivalent English skills should have been acquired otherwise.

ECTS Credits:

2 ECTS credits (total work load 54 hours including classroom meetings.)

Language of instruction:

English

Timing:

Biology: 1st year spring term

Chemistry: 1st year autumn term

Geology: 1st year spring term

Information Processing Science: 1st year spring term

Mathematical Sciences (pedagogy): 1st year spring term

Mathematical Sciences: 2nd year autumn term

Physical Sciences: 1st year autumn term

Learning outcomes:

By the end of the course, you are expected to be able to

- have acquired effective vocabulary learning techniques
- be able to distinguish parts of words to infer meanings
- utilize your knowledge of text structure and cohesion markers to understand academic texts
- extract information and learn content from English readings in scientific and professional contexts

Contents:

The course will focus on reading strategies; these include recognizing how texts are organized, identifying key points in a text, and understanding words in context. Vocabulary work in the course will focus on a) academic vocabulary, as used in formal scientific writing, and b) using your knowledge of the meanings of parts of words (affixes) to infer meaning.

Mode of delivery:

Contact teaching

Learning activities and teaching methods:

The scope of the course is 2 op (54 hours student workload).

Target group:

1st year students of Biology, Chemistry, Geology, Information Processing Science, Physics, and Mathematics (pedagogy); 2nd year students of Mathematics

Prerequisites and co-requisites:

-

Recommended optional programme components:

Students are also required to take 902004Y Scientific Communication, which is taken AFTER completion of this course.

Recommended or required reading:

Photocopies will be provided by the teacher and/or required texts will be accessible online or from the university library.

Assessment methods and criteria:

Student work is monitored by continuous assessment. You are required to participate regularly and actively in all contact teaching provided, and successfully complete all required coursework. There will be three monthly tests on material covered so far.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass/Fail

Person responsible:

Karen Niskanen

Working life cooperation:

-

Other information:

N.B. Students with grades *laudatur* or *eximia* in their A1 English school-leaving examination can be exempted from this course and will be granted the credits by the Faculty of Science.

902004Y: English 2 (Scientific Communication), 2 op

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Leikkaavuudet:

ay902004Y English 2 (Scientific Communication) (OPEN UNI) 2.0 op

Proficiency level:

B2/C1 on the CEFR scales

Status:

This course is mandatory for all 2nd year students (except **geographers**) who will have English as their foreign language in their B.Sc. degree. This includes the students who were exempted from 'Reading for Academic Purposes'(902002Y). Please consult the faculty study guide to establish the language requirements on your own degree programme.

Required proficiency level:

Students taking this course must have had English as the A1 or A2 language at school or the equivalent English skills should have been acquired otherwise. The course 'Reading for Academic Purposes' (902002Y) is a pre-requisite, unless exempted.

ECTS Credits:

The student workload is 53 hrs work/ 2 ECTS credits.

Language of instruction:

English

Timing:

Biology: 2nd year autumn term

Chemistry: 2nd year spring term

Geology: 2nd year spring term

Information Processing Science : 2nd year autumn term

Mathematics: 2nd year spring term

Physics: 2nd year autumn term

Learning outcomes:

By the end of the course, you are expected:

1. to have demonstrated your use of appropriate strategies and techniques for communicating effectively in English in an academic context.
2. to have demonstrated the ability to prepare and present scientific subjects to your classmates, using appropriate field-related vocabulary.

Contents:

Skills in listening, speaking, and presenting academic topics are practised in the classroom, where there is an emphasis on working in pairs and small groups. Homework tasks include online lecture listening and reading, preparation for classroom discussions and written work to support the classroom learning.

Mode of delivery:

Contact teaching

Learning activities and teaching methods:

Contact teaching 28 hours, homework 28 hours

Target group:

2nd year students of Biology, Chemistry, Geology, Information Processing Science, Mathematics, Physics

Prerequisites and co-requisites:

-

Recommended optional programme components:

Also required: [902002Y Reading for Academic Purposes Englannin kieli 1](#)

Recommended or required reading:

Course materials will be provided by the teacher.

Assessment methods and criteria:

Continuous assessment is based on regular attendance, active participation in all lessons and the successful completion of all homework tasks.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / fail.

Person responsible:

Karen Niskanen

Working life cooperation:

-

Other information:

-

750031Y: Orientation course for new students, 1 op

Voimassaolo: - 31.07.2017

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Vanhatalo, Minna-Liisa

Opintokohteen kielet: Finnish

Leikkaavuudet:

750032Y Orientation course for new students 2.0 op

ECTS Credits:

1 ECTS credit / 27 hours of work

Language of instruction:

Finnish.

Timing:

B.Sc. 1st autumn - spring.

Learning outcomes:

The aim of the course is to introduce new biology students to the university, academic studies, the department and the studies of biology, give knowledge of the social relevance of the degree programme and student is able to set own goals for the studies.

Contents:

Students orientate themselves with the help of group meetings, presentations and seminar to the academic studies. During the course students make their first personal study plan (HOPS) for the first study year.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Tutorials, presentations and seminar of major subjects, independent studying, total 30 h.

Target group:

Compulsory to the biology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Study guide.

Assessment methods and criteria:

Participation to the tutorials, presentations, seminar and doing the personal study plan for the first year.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Ph.Lic. Minna Vanhatalo.

Working life cooperation:

No.

Other information:

901035Y: Second Official Language (Swedish), Oral Skills, 1 op

Voimassaolo: 01.08.2014 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Opintokohteen kielet: Swedish

Leikkaavuudet:

- 901061Y Second Official Language (Swedish), Oral Skills 1.0 op
- ay901035Y Second Official Language (Swedish), Oral Skills (OPEN UNI) 1.0 op
- 901004Y Swedish 2.0 op

901034Y: Second Official Language (Swedish), Written Skills, 1 op

Voimassaolo: 01.08.2014 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Opintokohteen kielet: Swedish

Leikkaavuudet:

- 901060Y Second Official Language (Swedish), Written Skills 1.0 op
- ay901034Y Second Official Language (Swedish), Written Skills (OPEN UNI) 1.0 op
- 901004Y Swedish 2.0 op

300003Y: Activities in university and student organizations, 1 - 4 op

Voimassaolo: 01.01.2010 -

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Faculty of Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

Ei opintojaksokuvauksia.

750033Y: Tutorial for new students, 1 op

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Vanhatalo, Minna-Liisa

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

1 ECTS credit / 27 hours of work

Language of instruction:

Finnish.

Timing:

B.Sc. 3rd autumn / M.Sc. 1st autumn.

Learning outcomes:

Course develops students' skills to guide, make presentations, work in group and organize. It also advances planning, arrangement and guidance abilities as well as responsibility.

Contents:

The student guides a group of new students during the orientation course introducing them to the university, academic learning environment, the department, curriculum and other students with the help of small group meetings and presentations.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Tutorials and presentations. Minimum 15 hours. In addition independent work includes the preparation of the tutorials.

Target group:

Second and third year biology students.

Prerequisites and co-requisites:

Course 750031Y.

Recommended optional programme components:

-

Recommended or required reading:

Study guide and training material.

Assessment methods and criteria:

Tutoring report.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Ph.Lic. Minna Vanhatalo.

Working life cooperation:

No.

Other information:

-

806119P: A Second Course in Statistics, 5 op

Voimassaolo: 01.06.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opettajat: Jari Pääkkilä

Opintokohteen kielet: Finnish

Leikkaavuudet:

806113P	Introduction to Statistics A	5.0 op
806109P	Basic Methods in Statistics I	9.0 op

ECTS Credits:

5 ECTS credits

Language of instruction:

Finnish

Timing:

4th period

Learning outcomes:

Upon completion of the course, student will be able to

- analyze continuous and categorical response in the most common experimental and observational studies
- critically evaluate scientific articles

- implement and interpret analyses of a statistical software concerning issues of the course.

Contents:

- Skills for performing statistical analyses and inferences on the basis of data obtained in common experimental and observational studies are expanded and deepened
- statistical literacy of scientific articles with quantitative methods

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Total 50 h face-to-face teaching including lectures and exercise (partly computer exercises). Independent work 83 h.

Target group:

Minor students

Prerequisites and co-requisites:

The recommended prerequisite prior to enrolling for the course is the completion of the course: 806118P Introduction to Statistics or 806116P Statistics for Economic Sciences.

Recommended optional programme components:

After the course, student is able to continue other statistics courses.

Recommended or required reading:

Lecture notes

Assessment methods and criteria:

Mid-term exams and/or final exam and possible homework.

Grading:

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

Person responsible:

Jari Pääkkilä

Working life cooperation:

No

Other information:

-

780120P: Basic Principles in Chemistry, 5 op

Voimassaolo: 01.08.2016 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

780117P General and Inorganic Chemistry A 5.0 op

780109P Basic Principles in Chemistry 4.0 op

ECTS Credits:

5 credits/134 hours of work

Language of instruction:

Finnish

Timing:

1st autumn

Learning outcomes:

Upon completion of the course, the student will be able to display an understanding of basic chemistry phenomenon; equilibrium of acids and bases, chemical equilibrium, redox reactions and stoichiometry.

Contents:

Introduction to chemistry, stoichiometry, redox reactions, chemical equilibrium, the equilibrium of acid and bases, buffer solutions, titration, thermodynamics.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

40 hours of lectures and 94 hours of self-study

Target group:

Biology, Geology, Process Engineering, Environmental Engineering compulsory. Geography, optional.

Prerequisites and co-requisites:

The compulsory course in upper secondary school chemistry (1st course)

Recommended optional programme components:

The course is not included in the 25 ECTS credits entity of chemistry!

Recommended or required reading:

Tro, N.J., Principles of Chemistry. A Molecular Approach, Pearson, 3. edition, 2016

Assessment methods and criteria:

Final examination. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.

Person responsible:

Lecturer Minna Tiainen

Working life cooperation:

No

Other information:

No

030005P: Information Skills, 1 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Technology

Arvostelu: 1 - 5, pass, fail

Opettajat: Sassali, Jani Henrik, Ursula Heinikoski

Opintokohteen kielet: Finnish

Leikkaavuudet:

030004P Introduction to Information Retrieval 0.0 op

ECTS Credits:

1 ECTS credit

Language of instruction:

Finnish

Timing:

2nd or 3rd year

Learning outcomes:

Students know the different phases of information retrieval process and basic techniques of scientific information retrieval. They will find the most important reference databases of their discipline and know how to evaluate information sources and retrieval results.

Contents:

Retrieval of scientific information, the retrieval process, key databases of the discipline, and evaluation of information retrieval and information sources.

Mode of delivery:

Blended teaching: classroom training, web-based learning material and exercises in Optima environment, a final assignment on a topic of the student's own choice

Learning activities and teaching methods:

Training sessions 8h, group working 7h, self-study 12h

Target group:

Compulsory for all students of the Faculty of Technology, the Faculty of Information Technology and Electrical Engineering and the Faculty of Architecture. In the Faculty of Science compulsory for students of biology, physics, geosciences, chemistry and geography. Optional for students of biochemistry and mathematics.

Prerequisites and co-requisites:

-

Recommended optional programme components:

-

Recommended or required reading:

Web learning material <https://wiki oulu.fi/display/030005P>.

Assessment methods and criteria:

Passing the course requires participation in the training sessions and successful completion of the course assignments.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

pass/fail

Person responsible:

Science and Technology Library Tellus, tellustieto (at) oulu.fi

Working life cooperation:

-

Other information:

-

806118P: Introduction to Statistics, 5 op

Voimassaolo: 01.06.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opettajat: Jari Pääkkilä

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay806118P Introduction to Statistics (OPEN UNI) 5.0 op

806113P Introduction to Statistics A 5.0 op

ECTS Credits:

5 ECTS credits

Language of instruction:

Finnish

Timing:

3rd period

Learning outcomes:

After completing the course, student will be able to

- consider issues influencing to data collection
- describe data by appropriate methods (tables, statistics and graphical presentations)
- evaluate the effect size of the sample to the margin of error for instance in Gallup polls and in different market researches
- interpret output of a statistical software.

Contents:

- collecting data, e.g. sampling
- variables and measuring
- descriptive statistical methods and their selection
- margin of error of estimator for population mean and proportion
- statistical literacy
- basic analysis of data using statistical software

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Total 50 h face-to-face teaching including lectures and exercise (partly computer exercises). Independent work 83 h.

Target group:

Minor students

Recommended optional programme components:

After the course, student is able to continue other statistics courses.

Recommended or required reading:

Lecture notes

Assessment methods and criteria:

Mid-term exams and/or final exam and possible homework.

Grading:

Fail, 1-5

Person responsible:

Jari Pääkkilä

Working life cooperation:

No

Other information:

750124P: Basics of ecology, 5 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Jari-Heikki Oksanen, Orell, Markku Ilmari

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 1st spring.

Learning outcomes:

After completion of the course both biology and minor studies students understand better function of nature and the ecological phenomena in individual, population, community and ecosystem level.

Contents:

The course gives a student a basic idea about ecological interactions in individual-, population-, community- and ecosystem levels. In individual level the focus is on environmental demands of plants and animals. In population level the birth- and death rate of age groups and their effect on population growth is focused. In interactions between different species the emphasis is on how the competition between species leads to differentiation of niches. Predation is viewed as the regulatory effect on the population dynamics of prey populations. In community level the biodiversity and the patterns of succession are the main questions. In ecosystem level the emphasis is on energy flows and nutrient cycling. Evolution and adaptation are important in different fields of ecology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

The course is divided into three parts which follow the course book Krebs, C. J. 2009: Ecology (6th edition). 1st part: 24 hours of lectures based mainly on parts 1-2 of the course book. 2nd part: 24 hours of lectures are based on part 3 of the course book. 3rd part: students read the part 4 from the course book. In the course exam, there will be three questions, one from each part and all the questions have to be passed.

Target group:

Compulsory biology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Krebs, C. J. 2009: Ecology (6th edition). Part I.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Markku Orell and Prof. Jari Oksanen.

Working life cooperation:

No.

Other information:

-

750121P: Cell biology, 5 op

Voimassaolo: - 31.07.2020

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Häggman, Hely Margaretha, Henrika Honkanen, Kuittinen, Helmi Helena, Jaana Jurvansuu

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 1st autumn.

Learning outcomes:

The student is familiar with cellular structure and functioning in plant and animal cells, understands the social structures in multicellular species and knows why and how the genetic organizations (in nucleus, chloroplast and mitochondria) are co-operating, maintaining and regulating the cellular metabolism. Student understands the common origin and evolution of life on planet Earth, and understands the material basis and mechanisms of this continuity.

Contents:

During the recent years especially the development of molecular and microscopic and imaging techniques has increased our knowledge on cells and their social interactions. The structural and functional characteristics of plant and animal cells will be covered as well as the genetic organization maintaining and regulating the system.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

50 h lectures, three exams (zoology, plant biology, genetics). Home essays and internet material.

Target group:

Compulsory to the biology and biochemistry students.

Prerequisites and co-requisites:

Good basics in biology from elementary school.

Recommended optional programme components:

Cell biology is prerequisite for the following courses: Developmental biology-histology (755320A), Animal physiology (755323A), Plant biology lectures (756346A), Concepts of genetics (757109P). Course also gives readiness for studies in molecular biology and biochemistry.

Recommended or required reading:

Suitable parts of Campbell et al. 2014: Biology: a global approach (10e), Pearson, 1350 s. 978-1-292-00865-3, Alberts, B. et al. 2014: Molecular Biology of the Cell (6e), Garland Science Publishing, London, 1464 s. ISBN: 9780815345244 (or Lodish et al. 2012: Molecular Cell Biology (7e). Freeman, 973 s. ISBN-10: 1-4292-3413-X), Heino J. & Vuento M. 2014: Biokemian ja solubiologian perusteet (3. painos) WSOY Pro Oy, Helsinki, Jones R. et al. 2013: The molecular life of plants. Wiley-Blackwell, 742 s. ISBN : 978-0-470-87012-9.

The availability of the literature can be checked from [this link](#).

[\[HK1\]](#)linkkiä en osannut uudistaa

Assessment methods and criteria:

Three exams.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail. Final grade is average value of the three exams.

Person responsible:

Dr. Jaana Jurvansuu, Dr. Helmi Kuittinen and Prof. Hely Häggman.

Working life cooperation:

No.

Other information:

-

757109P: Concepts of genetics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Savolainen Outi

Opintokohteen kielet: Finnish

Leikkaavuudet:

757122P Concepts of genetics for biochemists 3.0 op

753124P Concepts of genetics 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 1 st spring.

Learning outcomes:

To understand and apply basic concepts of genetics, at Mendelian and molecular level.

Contents:

Part 1. Mendelian genetics, including the ideas of quantitative and population genetics. Part 2. Molecular genetics: replication, transcription, translation, genetic code, mutations, repair of DNA. Part 3. Selected topics on developmental genetics, and genetics of health and diseases.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

50 h lectures and seminars, 83 h independent studies, exam.

Target group:

Compulsory to the biology students (5 cr) Biochemistry students: parts 1 and 3 (3 cr) compulsory.

Prerequisites and co-requisites:

Cell biology (750121P) or equivalent knowledge.

Recommended optional programme components:

This course is prerequisite to all other genetics courses.

Recommended or required reading:

Materials are in Optima. Klug et al. 2012. Concepts of Genetics (10. ed). Pearson, 896 p. Alberts, B. et al. 2008: Molecular Biology of the Cell (5. ed). Garland Science Publishing, London, 1268 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Homeworks, home exams, lecture diary, exams.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

757110P: Experimental course in general genetics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kuittinen, Helmi Helena

Opintokohteen kielet: Finnish

Leikkaavuudet:

753104P Experimental course in general genetics 6.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. degree, 1 st spring.

Learning outcomes:

After passing the course students have elementary knowledge of basic phenomena of genetics, important working methods and laboratory organisms. Student has the basic ability to understand, apply and analyse simple genetical works and phenomena.

Contents:

Investigation of Mendelian inheritance, gene mapping and nonadditive effects of genes using cross-breeding; basics of population genetics; investigation of promoter regulation and microbial recombination; investigation of mitosis and meiosis using cytogenetical methods; basic methods of DNA techniques (isolating DNA, digesting DNA using restriction enzymes, PCR and electrophoresis).

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

18 h demonstrations, 45 h exercises, independent work, exam, report.

Target group:

Compulsory for biology students.

Prerequisites and co-requisites:

Concepts of genetics (757109P) or equivalent knowledge.

Recommended optional programme components:

Course is prerequisite to all the following genetics courses.

Recommended or required reading:

Course handout.

Assessment methods and criteria:

Report, final exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Helmi Kuittinen

Working life cooperation:

No.

Other information:

-

755323A: Animal physiology, 5 op

Voimassaolo: 01.08.2015 - 31.07.2020

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

751388A Animal physiology, lectures 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 2nd spring.

Learning outcomes:

After completing the course the student is able to form a general view of animal body functions, the regulation of organ systems, and the background of human health and diseases.

Contents:

Course focus on the basic problematic of physiological themes including nervous system, muscles, circulation, nutrition, metabolism, immune system, hormones and reproduction physiology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

50 h lectures and independent studying, mid-semester exams, home essays.

Target group:

Compulsory to the biology students.

Prerequisites and co-requisites:

Cell biology (750121P) or equivalent knowledge.

Recommended optional programme components:

This course is a prerequisite for the courses Animal physiology, exercises (755318A), Comparative animal physiology (751x84A/S) and Advanced course in animal physiology (751635S).

Recommended or required reading:

Reece, J.B. Urry, L.A. Cain, M.L., Wasserman, S.A. Minorsky, P.V. & Jackson R.B. 2011: Campbell Biology (9e). Pearson, Global Edition, 1309 p, handouts. The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Home essays and exam. Read more about [assessment criteria](#) at the University of Oulu webpage.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Esa Hohtola.

Working life cooperation:

No.

Other information:

-

750366A: Bachelor of Science final examination, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 3rd year.

Learning outcomes:

Student will understand basic methods, results and theories in ecology, physiology or genetics.

Contents:

Examinations on books related to B.Sc. thesis subject. List of books are presented on WebOodi. All the books are recommended to be done on the same exam in Examinarium.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Students make workshops where they discuss content of the books. Book exam (4 h). Exam is held in Examinarium.

Target group:

Compulsory to the biology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

BSz:

- Option 1: Randall etc.: Eckert's Animal Physiology, 5. ed., 2002 or newer, (chapter 4 onwards).
 - Option 2: Richard W. Hill, Gordon A. Wyse, and Margaret Anderson: Animal Physiology, 2. ed., Sinauer Press, 2008.
- Other books can be agreed on special reasons with prof. Esa Hohtola.

BSg

- Klug, W. S., Cummings, M. R., Spencer, C.A ja Palladino M.A.: Concepts of Genetics (11. ed.). Pearson & Prentice Hall, 2015
- Remember to mention the book edition to the teacher which book edition you read.
- responsible teacher dos. Helmi Kuittinen

BSb

- Option 1: Ridge, I. 2002. Plants. Oxford University Press, 344 p. ISBN 0-19-925548-2
- Option 2: Mauseth, J.D. 2009. An introduction to plant biology. 4th ed.
- Other books can be agreed on special reasons with prof. Hely Häggman.

ECOz

Exam book ensemble (5 cr.) is chosen from the following list:

- Bennett, P.M. & Owens, I.P.F. 2002. Evolutionary ecology of birds. Life histories, mating systems and extinction. – Oxford University Press. 206 p. (2 cr)
- Hanski, I. 2007. The Scrambling world. (2 cr.)
- Davies, N.B. Krebs, J.R. & West, S.A. 2012. An introduction to behavioural ecology. – Blackwell, 441 p. (4 cr).
- Mayr, E. 1999. Biologia. Elämän tie. – Art House, 327 p. (2 cr)
- Primack, R.B. 2012. A primer of conservation biology (4. ed). – 309 p. (2 cr).
- Smith, J.N.M., Keller, L.F., Marr, A.B. & Arcese, P. 2006. Conservation and biology of small populations. – Oxford University Press. 205 p. (2 cr)
- Other books can be agreed on special reasons with prof. Markku Orell

ECOb

- Larcher W. 2003. Physiological Plant Ecology 4th edition, 513 p.
- Ridge I. (Ed.) 2002. Plants. Oxford University Press, 345 p.
- Salonen V. 2006. Kasviekologia. 306 p., WSOY.
- Willis K.J. and McElwain J.C. 2002. The evolution of plants. 378 p. Oxford University Press.
- Scott Peter 2008. Physiology and Behaviour of Plants. Wiley, 305 p.
- Timonen, S & Valkonen, J. 2013. Sienten biologia. Gaudeamus, 448 p.
- Other books can be agreed on special reasons with prof. Jari Oksanen

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Exam in Examinarium.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

M.Sc. Henrika Honkanen, Prof. Hely Häggman, Prof. Jari Oksanen, doc. Helmi Kuittinen and Prof. Markku Orell.

Working life cooperation:

No.

Other information:

-

750332A: Bachelor of Science maturity exam, 0 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

0 ECTS credits / 2-4 hours of work.

Language of instruction:

Finnish / Swedish / English.

Timing:

B.Sc. degree.

Learning outcomes:

The student is well acquainted with the subject of the thesis and shows good first language skills.

Contents:

After completing the Bachelor of Science Thesis, the student writes an essay in his/her native language on the thesis, to show a good command of the language and the topic of the thesis. Maturity exam will be done in Examinarium.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Detailed instructions on Noppa. Four pages long essay exam. One teacher examine the maturity exam and Pro gradu working group accepts it. 4 h exam.

Target group:

Compulsory to the biology students. Exam is taken after completion of the thesis.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Four pages long essay. Done in Examinarium.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

750376A: Bachelor of Science seminar and thesis, 10 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

750396A Bachelor of Science seminar 3.0 op

ECTS Credits:

10 ECTS credits / 267 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 3 rd year. BS and ECO: scientific writing and Introduction to information retrieval autumn, workshop spring.

TEA: scientific writing, Introduction to information retrieval and workshop autumn

Learning outcomes:

B.Sc. seminar: Student will know the technical and ethical principles of scientific writing and publishing. She/he has the capability to make a scientific review (BSc thesis) and present it clearly as a poster or an oral presentation. *B.Sc. thesis:* Student is able to plan and write up thesis by getting acquainted to an interesting biology subject and reviewing it critically with the help of relevant scientific source material.

Contents:

Independent research work on a scientific subject in agreement with the responsible professor and under the supervision of the degree programme. The supervisors may be professors of the department, docents and other teachers and researchers who have the docent's status. The student may have several supervisors, the other supervisor may be from other department, university (also abroad) or from research institute. The subject must be agreed on with the professor in advance. The research work can contain fieldwork, laboratory work, theoretical work or work on collections in museum. The work always includes a literature survey. After having completed the thesis,

the student writes the Maturity Exam. The dean will order the examiners by the proposal of the professor. Pro gradu working group accepts and grades the thesis on the basis of the examiners' opinions.

List of the actual B.Sc. thesis topics is on Noppa.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

BSc seminar: Info lectures, computer exercises, group and peer support, seminar or poster presentation. BSc thesis: About 15 pages long thesis.

Target group:

Compulsory to the biology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

Done at the same time as B.Sc. seminar workshop in spring, subject teacher students have seminar workshop in the autumn.

Recommended or required reading:

-

Assessment methods and criteria:

B.Sc. seminar: Tutorial group and presentation. *B.Sc. thesis:* Thesis.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

B.Sc. seminar: Doc. Seppo Rytkönen. *B.Sc. thesis:* Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

750373A: Biogeography, 5 op

Voimassaolo: 01.08.2015 - 31.07.2019

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kvist, Laura Irmeli, Jari-Heikki Oksanen

Opintokohteen kielet: Finnish

Leikkaavuudet:

750173P Biogeography 5.0 op

750363A Biogeography 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 1st autumn.

Learning outcomes:

The course introduces students to basic concepts of biogeography, patterns of distribution and historical and present factors affecting the distribution. Plant biogeography introduces students to modern and historical factors controlling the plant cover, and to the special methods of vegetation science.

Contents:

The course consists of general part and optional part on plant biogeography and vegetation science. The general part introduces basic models and theories of distribution of organisms in the environment. Historical, evolutionary, geographical, climatic and ecological explanations. Research methods used in biogeography. The part on plant biogeography and vegetation science introduces methods on factors controlling the structure and composition of vegetation, and describes major vegetation types in Finland and principal biomes in the World. Methods of vegetation science are briefly surveyed.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

General biogeography: 24 h lectures, independent work (3 cr), **Plant biogeography:** 24 h lectures (2 cr); two exams.

Target group:

Compulsory for biology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

Other recommended courses related to the field: Basics of Ecology (750124P), Evolution and systematics of organisms (750372A), Evolution, systematics and morphology of organisms, practicals (750374A), Biodiversity in human changed environments (755631S).

Recommended or required reading:

Cox, C.B. & Moore, P.D. 2005: Biogeography. An ecological and evolutionary approach (7 ed.), Blackwell Publishing Ltd, or Cox, C.B. & Moore, P.D. 2010: Biogeography. An ecological and evolutionary approach (8 ed.), John Wiley & Sons Inc.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Two exams.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail. Final grade is average value of the two exams.

Person responsible:

Doc. Laura Kvist and Prof. Jari Oksanen.

Working life cooperation:

No.

Other information:

-

755320A: Developmental biology-histology, lectures, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

751367A Developmental biology-histology, lectures 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 1 st spring.

Learning outcomes:

After completing the developmental biology -part of the course the student is able to name the most important events of embryonic development and the structural changes related to them. The student is also able to describe the principles gene regulation related to embryonic development. After completing the histology-part of the course the student is able to describe the various tissue types and the microscopic structure of important organs and is also able to identify tissue types and organs from microscopic sections.

Contents:

Motto: "It is not birth, marriage, or death, but gastrulation, which is truly the most important time in your life." (Lewis Wolpert, 1986). Developmental biology will cover gametogenesis, fertilization, forming of embryonic tissue layers (gastrulation), embryonic induction, signal molecules and the differentiation of the most important tissues and organs (organogenesis). Histology will first cover

various tissue types, their cell types and matrix composition. Thereafter, the microscopic structure and tissue composition of various organs and organ systems will be covered. In both parts, practical exercises on drawing from microscopic slides (see 755317A) will support lectures.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

38 h lectures and two exams.

Target group:

Compulsory to biology students.

Prerequisites and co-requisites:

Cell biology (750121P) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Lecture notes, lecture handouts. Recommended reading: Sariola, Frilander ym., Solusta yksilöksi: Kehitysbiologia, Duodecim, Helsinki 2003; Gilbert: Developmental Biology, Sinauer Press, 6.ed. 2000, or newer; Young & Heath: Wheater's Functional Histology, Churchill Livingstone, 4. ed. 2000, or newer. The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

2 lecture exams. Read more about [assessment criteria](#) at the University of Oulu webpage.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

MSc Henrika Honkanen.

Working life cooperation:

No.

Other information:

-

750372A: Evolution and systematics of organisms, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Marko Mutanen, Annamari Markkola, Jari-Heikki Oksanen

Opintokohteen kielet: Finnish

Leikkaavuudet:

750307A Evolution and systematics of organisms 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 2nd autumn.

Learning outcomes:

Students will learn a general picture of the diversity of life-forms as to understand the evolutionary history of organisms.

Contents:

The course provides an insight into the biological evolution and evolutionary processes reflected by the systematic classification of the organisms. Also basic principles and concepts of systematics and classification are presented.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

30 h lectures.

Target group:

Compulsory to the biology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

Lectures give basic ability to different biology subjects.

Recommended or required reading:

Net material and supplementary reading: Bell, P.R. & Helmsley, A.R. 2000: Green Plants. Their origin and diversity. 2nd ed. Cambridge University Press., Willis, K.J. & McElwain, J.C. 2002: The evolution of plants. Oxford University Press. Hickman, C. P. et al. 2009. Animal Diversity, 5th edition, McGraw Hill New York.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Lecture exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Arja Kaitala, Prof. Jari Oksanen and Doc. Annamari Markkola.

Working life cooperation:

No.

Other information:

-

756343A: Field course in ecological botany, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Annamari Markkola

Opintokohteen kielet: Finnish

Leikkaavuudet:

752304A Field course in ecological botany 5.0 op

ECTS Credits:

5 cr / 133 h of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 1st summer. ECOGEN 1st summer.

Learning outcomes:

Student is able to identify most common boreal plant species in the field, to plan and conduct ecological field experiments and use basic methods in vegetation analyses.

Contents:

Vegetation in the coast of Bothnian Bay in Hailuoto and/or Oulu (3 days). Basics of boreal forest and mire vegetation classification and types at Oulanka Research Station (7 days). Vegetation research and basic methods of stock estimation. Mire vegetation development and ecological biodiversity.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures 10 h, field demonstrations and laboratory exercises, excursions 84 hours in Oulu and/or Hailuoto and Oulanka Research Station. Field exams for plant identification and mire ecology, report.

Target group:

B.Sc. Compulsory to ECO 5 cr and TEA 5 cp, TEA: at least 10 cr compulsory, two field courses, one ecological botany field course (756343A) and other animal field course (either 755321 or 755322A).

Prerequisites and co-requisites:

Identification of plant species (756354A) 5 cr or equivalent knowledge.

Recommended optional programme components:

Course has capacity for 32 or 40 students. Possible elimination of the candidates is done by study success and Plant identification (756354A) grade. This course is a prerequisite for courses Plant ecology (752600S), Mire ecology (752692S) and Field course in Arctic-Alpine ecology and vegetation (752642S).

Recommended or required reading:

Laitinen et al. 2012: Field course in ecological botany; Hanhela, P. & Halonen, P. 1995: Plant identification; Huttunen, A. 1995: Introduction to forest types; Eurola, S., Hicks, S. and Kaakinen, H. 1994: Key to Finnish mire types, pp. 12-117 in: Moore, P. D. (ed.), 1994 European mires, London Academic Press, London, 367 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Field exams, report.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

doc. Annamari Markkola.

Working life cooperation:

Essential working life skills are learned during the field course.

Other information:

-

755333A: Identification of animals, 6 op

Voimassaolo: 01.08.2016 - 31.07.2019

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Koivula

Opintokohteen kielet: Finnish

Leikkaavuudet:

755334A Identification of animals, vertebrates 4.0 op

ECTS Credits:

6 ECTS credits / 162 hours of work.

Language of instruction:

Finnish / English

Timing:

B.Sc. degree 1st autumn and spring.

Learning outcomes:

Main point of the course is to learn to identify Finnish animal species (vertebrate) and families (invertebrate) from museum samples. Basics of species' ecology and classification of organisms.

Contents:

During the autumn semester (9 h lectures in Finnish, 16 h exercises, exam), the Finnish vertebrate fauna is studied using stuffed museum samples. In the spring semester (9 h lectures in Finnish, 16 h exercises, exam) the invertebrate taxons (mostly family- or genus-level) common in Finland are studied using museum samples.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

18 h lectures in Finnish, 32 h exercises, independent studying, 2 exams.

Target group:

Biology students: compulsory.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

This course is needed for attending courses Field course in terrestrial animals (755322A) and Field course in aquatic animals (755321A).

Recommended or required reading:

Course handouts, Itäemies J. ja Viro P. 1995: Eläinten lajintuntemus, selkärangattomat, 73 p.; Putaala, A., Marjakangas, A. & Rytönen, S. 2001: Eläinten lajintuntemus, selkärangaiset, 42 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Two species exams.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Kari Koivula.

Working life cooperation:

No.

Other information:

-

Compulsory

755333A-01: Basic identification of animals, vertebrate, 0 op

Voimassaolo: 01.08.2016 - 31.07.2019

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Pudas, Tuula Kaarina, Kari Koivula

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

755333A-02: Basic identification of animals, invertebrate, 0 op

Voimassaolo: 01.08.2016 - 31.07.2019

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Marko Mutanen

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

756342A: Identification of plant species, 3 - 4 op

Voimassaolo: 01.08.2015 - 31.07.2017

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Annamari Markkola

Opintokohteen kielet: Finnish

Leikkaavuudet:

756355A Identification of plant species, brief 3.0 op

750303A Nature conservation and land use 3.0 op

ECTS Credits:

3-4 ECTS credits / 80-107 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 1st autumn. ECOGEN 1st autumn.

Learning outcomes:

Student is able to identify most common boreal plant species in herbarium specimens.

Contents:

Demonstrations (16 h) and/or independent study of ca. 350 vascular plants, mosses and lichens in the boreal vegetation zone. 3 cr. without the literature in the exam and 2 cr. with the literature in the exam. In the identification exam student has to know specimens scientific name and family in latin.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Demonstrations (16 h) and/or independent study of ca. 350 vascular plants, mosses and lichens in the boreal vegetation zone. 4 cr without the literature in the exam and 3 cr with the literature in the exam. In the identification exam student has to know specimens scientific name and family in latin.

Target group:

4 cr compulsory to TEA and ECO; 3 cr compulsory to BS.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

Course is prerequisite for the Field course in ecological botany (756343A) and for the advanced plant species identification courses.

Recommended or required reading:

Laitinen et al. 2012: Field course in ecological botany; Hanhela, P. & Halonen, P. 1995: Plant identification; Huttunen, A: 1995: Introduction to forest types; Euroola, S., Hicks, S. and Kaakinen, H. 1994: Key to Finnish mire types, pp. 12-117 in: Moore, P. D. (ed.), 1994 European mires, London Academic Press, London, 367 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Species exam. 4 cr without the literature and 3 cr with the help of the literature.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Annamari Markkola.

Working life cooperation:

No.

Other information:

-

756346A: Plant biology lectures, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Anna-Maria Pirttilä, Häggman, Hely Margaretha

Opintokohteen kielet: Finnish

Leikkaavuudet:

752345A Basics of functional plant biology, lectures 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 2nd spring.

Learning outcomes:

The student can understand and explain the function and regulation of plant cells, tissues and entire plants.

Contents:

The most important phenomena of plant life, like photosynthesis, nitrogen metabolism and plant hormones are discussed.

Mode of delivery:

Face-to-face teaching, book exam.

Learning activities and teaching methods:

Lectures (20 h) and exams.

Target group:

Compulsory to the biology students.

Prerequisites and co-requisites:

Cell biology (750121P) or equivalent knowledge helps in following this course. This course is a prerequisite for course Plant biology practicals (756341A) and Advanced course in plant biology (752682S).

Recommended optional programme components:

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Recommended or required reading:

Taiz, L. et al. 2015. Plant Physiology and Development. Sixth Edition. 761 p. Sinauer Associates, Inc. ISBN-9781605352558.

Terävä, E. & Kanervo, E. 2008: Kasvianatomia or equivalent.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Lectures, book, exams.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Hely Häggman and Doc. Anna Maria Pirttilä.

Working life cooperation:

No.

Other information:

-

755321A: Field course in aquatic animals, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Muotka, Timo Tapani, Kaisa-Leena Huttunen

Opintokohteen kielet: Finnish

Leikkaavuudet:

751307A Field course in aquatic animals 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 1st summer. ECOGEN 1st summer.

Learning outcomes:

To learn basic methods in biological freshwater sampling and to identify the most common freshwater taxa.

Contents:

Basics of freshwater ecology. Demonstrations of the most frequently-used biological sampling methods. Identification of the most common freshwater fishes, invertebrates and zooplankton.

Mode of delivery:

Face-to-face teaching and independent studying.

Learning activities and teaching methods:

Summer: 50 h of field work and demonstrations at the Oulanka research station, 83 h of independent studying including a reading package.

Target group:

Compulsory (5 cr) to ECO. TEAeco: either Field course in aquatic animals 5 cr (755321A) or Field course in terrestrial animals 5 cr (755322A) is compulsory for biology major, the other field course can be included to the ecology minor. TEAbs, alternatively compulsory to TEAbs either Field course in aquatic animals 5 cr or Field course in terrestrial animals 5 cr. TEA: at least 10 cr compulsory, two field courses, one animal and other botany field course (756343A).

Prerequisites and co-requisites:

Basic identification of animals (755333A) or equivalent knowledge (if necessary, selection to the course 755321A can be based on success in course 755333A).

Recommended optional programme components:

This course is a prerequisite for the following: Winter ecology and physiology (750377A), Special course in aquatic invertebrates (754627S), Assessment and monitoring of the ecological status of water bodies (754625S), Field methods in freshwater biomonitoring (754626S).

Recommended or required reading:

Reading package, handouts and lectures given before / during the course.

Assessment methods and criteria:

On the final course day species identification exam on the species met during the course, practical exam on the sampling methods and theoretical exam based on the literature and demonstration material.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Timo Muotka.

Working life cooperation:

No.

Other information:

-

755322A: Field course in terrestrial animals, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Seppo Rytkönen

Opintokohteen kielet: Finnish

Leikkaavuudet:

751306A Field course in terrestrial animals 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. - 1st summer. ECOGEN 1st summer.

Learning outcomes:

The aim of the course is to learn the basics of field identification and ecology of terrestrial animals in northern Finland. The student will understand that proper skills in species identification and knowledge of species' ecology are the basis of ecological research.

Contents:

The fauna in different kinds of terrestrial habitats is studied using several ecological sampling and research methods. The course is held at the Oulanka Research Station, Kuusamo, and deals with identification and ecology of invertebrates, mammals (especially small mammals), gallinaceous birds and birds of prey. The exercises take place partly in the field and partly in the laboratory. Data gained during the course is analyzed. The results are reported (in PowerPoint) and presented in the final seminar in Kuusamo.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Part 1. (Oulu): 2 h demonstration, independent studying. Part 2. (Oulanka): 49 h demonstrations and practicals, one species and theory exam, seminar.

Target group:

Compulsory (5 cr) to ECO. TEAeco: either Field course in aquatic animals 5 cr (755321A) or Field course in terrestrial animals 5 cr (755322A) is compulsory for biology major, the other field course can be included to the ecology minor. TEAbs, alternatively compulsory to TEAbs either Field course in aquatic animals 5 cr or Field course in terrestrial animals 5 cr. TEA: at least 10 cr compulsory, two field courses, one animal and other botany field course (756343A).

Prerequisites and co-requisites:

Basic identification of animals (755333A) or equivalent knowledge.

Recommended optional programme components:

This course is a prerequisite to course Winter ecology and physiology (750377A).

Recommended or required reading:

Compulsory at Oulanka: 1) Rytönen, S. ym. 2003: 751306 Maaeläimistön tuntemus ja ekologia. - Biologian laitoksen monisteita 3/2003. Oulun yliopisto, Oulu. 2) Pentinsaari, M. ym. 2015: Eläinten lajintuntemus, selkärangattomat. Oulun yliopisto, Oulu. Insect book recommended: Chinery, M. 1988 Pohjois-Euroopan hyönteisheimojen määrittäminen, Tammi, Helsinki, 2. painos.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Theory exam, species identification exam, seminar presentation.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Seppo Rytönen.

Working life cooperation:

No.

Other information:

Binoculars, bird identification book, suitable outfit. Preparation knife, preparation scissors and sharp cusp tweezers.

757110P: Experimental course in general genetics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kuittinen, Helmi Helena

Opintokohteen kielet: Finnish

Leikkaavuudet:

753104P Experimental course in general genetics 6.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. degree, 1 st spring.

Learning outcomes:

After passing the course students have elementary knowledge of basic phenomena of genetics, important working methods and laboratory organisms. Student has the basic ability to understand, apply and analyse simple genetical works and phenomena.

Contents:

Investigation of Mendelian inheritance, gene mapping and nonadditive effects of genes using cross-breeding; basics of population genetics; investigation of promoter regulation and microbial recombination; investigation of mitosis and meiosis using cytogenetical methods; basic methods of DNA techniques (isolating DNA, digesting DNA using restriction enzymes, PCR and electrophoresis).

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

18 h demonstrations, 45 h exercises, independent work, exam, report.

Target group:

Compulsory for biology students.

Prerequisites and co-requisites:

Concepts of genetics (757109P) or equivalent knowledge.

Recommended optional programme components:

Course is prerequisite to all the following genetics courses.

Recommended or required reading:

Course handout.

Assessment methods and criteria:

Report, final exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Helmi Kuittinen

Working life cooperation:

No.

Other information:

-

757313A: Basics in population genetics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Lumi Viljakainen

Opintokohteen kielet: Finnish

Leikkaavuudet:

753314A Basics in population genetics 8.0 op

ECTS Credits:

5 cr / 133 hours of work.

Language of instruction:

English.

Timing:

B.Sc. 2nd spring BSg, M.Sc. 1st spring, ECOGEN ECOz and ECOB BS. Introduction to Population genetics compulsory to B.Sc. in M.Sc. degree.

Learning outcomes:

This course introduces genetic theories, basics of phylogenetics and usage of molecular biology methods in ecology. The aim is that students know the basic methodology, can apply them into variety of genetic and ecological questions and is familiar with basics of population genetics and phylogenetics in order to be able to analyze and interpret genetic data.

Contents:

Basics of population genetics (variation, effective population size, bottlenecks, population structure, gene flow), relationships between molecular and adaptive variation, phylogenetic methods and phylogeography. Usage of molecular methods for identification of species, sex and individuals, behavioural ecology (mating systems, cooperation, mating success) and conservation.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Population genetics: 20 h lectures, 4 h seminars, 24 h exercises (problem solving, laboratory and computer exercises), report, essays, home exam, final exam.

Molecular ecology: 20 h lectures, 4 h seminars, 36 h exercises (laboratory and computer exercises), final exam.

Target group:

BS, ECO, ECOGEN.

Prerequisites and co-requisites:

Concepts of genetics (757109P) and Experimental course in general genetics (757110P) or equivalent knowledge ja Molekyyli evoluutio (757312A).

Recommended optional programme components:

Other related courses : *Population genetics*: Molecular evolution (757312A), before Quantitative genetics and plant and animal breeding (757616S). This course is a prerequisite to courses Experimental course in bioinformatics and molecular evolution (753624S), Bioinformatics (757619S), DNA analysis in population genetics (757618S).

Molecular ecology: Basics in population ecology (756351A) and Advanced course in population ecology (755626S).

Recommended or required reading:

Hedrick 2005: Genetics of populations 3. or 4. ed. Beebe, T and Rowe G. 2004 or 2008. An introduction to molecular ecology. Oxford University Press.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Population genetics: Home exam, final exam, seminar, essays, reports.

Molecular ecology: Final exam and seminar.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Lumi Viljakainen and Doc. Laura Kvist.

Working life cooperation:

No.

Other information:

Note that Introduction to Molecular ecology and Introduction to population genetics courses are alternative; students cannot get credits from both.

757314A: Basics of bioinformatics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Lumi Viljakainen

Opintokohteen kielet: Finnish

Leikkaavuudet:

750340A Basics of bioinformatics 3.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. studies, 3rd autumn.

Learning outcomes:

After the course the student knows and is able to use the basic methods for handling the nucleotide and protein sequences. The aim is that the student learns how to use the databases, understands the background and principles of the analytic methods, is able to take up a critical attitude towards the used methods and gets a good background for applying new methods that are developed continuously.

Contents:

Searching of material from the databases, inferring the function of a gene and structure of a protein based on sequence data, comparing the sequences and evaluating the differences between them as well as examining the evolution history of the genes.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

12 h lectures, 2 h seminar, 20 h exercises, independent work.

Target group:

BT: compulsory, recommended for all biologists. Suitable also for biochemists.

Prerequisites and co-requisites:

Course Concepts of genetics (757109P) or equivalent knowledge also Molecular evolution (757312A) is recommended.

Recommended optional programme components:

-

Recommended or required reading:

Jonathan Pevsner 2009: Bioinformatics and Functional Genomics. Wiley-Blackwell.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Reports or exam, exercises, seminar presentation, independent work and student activity.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Lumi Viljakainen.

Working life cooperation:

No.

Other information:

-

752388A: Basics of plant tissue culture, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Häggman, Hely Margaretha, Anna-Maria Pirttilä

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 2nd or M.Sc. 1st autumn.

Learning outcomes:

The course aims to help students learn to basic plant tissue culture concepts, to establish tissue culture systems and to understand totipotency.

Contents:

Preparation of culture media and establishment of sterile cultures starting from different plant organs and tissues.

Students are able to understand how plant hormones affect differentiation of tissues.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

8 h lectures, 35 h demonstrations and exercises, essay, seminar.

Target group:

B.Sc. degree BS: optional, M.Sc. degree BSb: compulsory.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

Course gives ability to further studies in molecular biology.

Recommended or required reading:

Course handout the book: Neumann K-H, Kumar A, Imani J (2009): Plant Cell and Tissue Culture – A tool in Biotechnology.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Essay, exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Hely Häggman and Doc. Anna Mari Pirttilä.

Working life cooperation:

No.

Other information:

-

757312A: Molecular evolution, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kuittinen, Helmi Helena

Opintokohteen kielet: Finnish

Leikkaavuudet:

753327A Molecular evolution 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English. Lectures are in Finnish, but non-speakers can make an exam based on literature.

Timing:

B.Sc. 2nd autumn.

Learning outcomes:

After the course the student knows some basic methods that are used to study the history of living organisms and their evolutionary mechanisms. The student knows the main concepts in the field and can read scientific articles in molecular evolution.

Contents:

Basic methods of estimation of nucleotide substitution rates, building of phylogenetic trees with distance based methods and parsimony. Evolution of the genome structure and size. Scientific articles.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

24 h lectures, 16 h exercises/seminar, 40 h independent studies exam.

Target group:

Compulsory for biology students.

Prerequisites and co-requisites:

Concepts of genetics (757109P) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Additional reading Graur, D. and Li, W.-H. 1999: Fundamentals of Molecular Evolution. Sinauer, Massachusetts. The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Exam/home exam, homework, exercises.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Helmi Kuittinen.

Working life cooperation:

No.

Other information:

-

757311A: Molecular methods I, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kuittinen, Helmi Helena

Opintokohteen kielet: Finnish

Leikkaavuudet:

750364A Molecular methods I 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

BS: B.Sc. 2nd autumn, ECOGEN 1st autumn

Learning outcomes:

After the course the student is able to use the basic methods of DNA work. The student can isolate DNA from different organisms, estimate the quality and quantity of the DNA, amplify DNA fragments with the polymerase chain reaction, design PCR primers and sequence DNA. The student is able to evaluate his results and optimize methods to some degree. The student can write a simple scientific report.

Contents:

Isolation of genomic DNA, amplification of DNA with PCR, primer design, DNA sequencing with the Sanger dideoxy method from a PCR product and from a cloned material. Computer programs needed for DNA-sequence and fragment analysis. Basic elements of a scientific report.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

48 h exercises including demonstrations, 85 h independent work including homework and reports.

Target group:

Compulsory to BS, suitable for ECO students who are interested in population and evolutionary ecology.

Prerequisites and co-requisites:

Concepts of genetics (757110P) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Reports.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail

Person responsible:

Doc. Helmi Kuittinen.

Working life cooperation:

No.

Other information:

-

756341A: Plant biology practicals, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Anna-Maria Pirttilä

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 2nd spring.

Learning outcomes:

The student can differentiate the basic structures of higher plants at microscopic and macroscopic level and understands the relationship between structure and function.

Contents:

The student can interpret the meaning of structure behind function at microscopic and macroscopic level. After completing the course, the student is able to plan small physiological research projects and can analyze, interpret and report the results in a scientific form.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

45 h laboratory exercises. Exercises are done in pairs and reports are made as team work.

Target group:

BS: compulsory, TEAbs optional.

Prerequisites and co-requisites:

Cell biology (750121P) and Basics in functional plant biology, lectures (756346A).

Recommended optional programme components:

Basics in plant biology is prerequisite to Advanced course in plant biology (752682S).

Recommended or required reading:

Terävä, E. & Kanervo, E. 2008: Kasvianatomia or equivalent knowledge, Taiz, L. & Zeigler, E. 2010: Plant Physiology (parts), Sinauer Ass., Sunderland Mass.; Hohtola ym.: Harjoitustyömoniste.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Laboratory exercises, reports.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Anna Maria Pirttilä.

Working life cooperation:

No.

Other information:

-

756353A: Plant developmental biology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Häggman, Hely Margaretha

Opintokohteen kielet: Finnish

Leikkaavuudet:

756332A Plant developmental biology 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 3rd spring.

Learning outcomes:

The student has a comprehensive view on plant development and show knowledge of the recent methods used in the research of plant developmental biology.

Contents:

Modern methods in plant biology and especially the mutant or genetically modified plants have been in a key role to understand factors, mechanisms and regulation affecting plant development. The lectures include cell level information (cell division, growth and differentiation), embryo development, meristem formation and maintenance, organ development and cell death as a role of normal plant development. Moreover, the role of environmental factors in plant development will be covered.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Developmental biology 20 h lectures, home essay / seminar and final exam.

Target group:

Compulsory to BS and ECO, TEA: optional.

Prerequisites and co-requisites:

Basics of plant biology (756346A) is recommended as prerequisite.

Recommended optional programme components:

-

Recommended or required reading:

Lectures and supplementary material. Timmermans, M.C.P.: Plant Development. 2010. Elsevier.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Hely Häggman.

Working life cooperation:

No.

Other information:

-

756304A: Plant ecophysiology in changing environments, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Taulavuori

Opintoalueen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 3rd or M.Sc. 1st spring.

Learning outcomes:

After finishing the course student understands interactions between plant and environment, and has become acquainted to most important experimental methods in physiological plant ecology and student can apply research parameters. Student can apply the knowledge to plant production and environmental protection issues.

Contents:

The aim of the course is to initiate the students into the basics of plant ecophysiology in changing environments. The physical, chemical (abiotic) and biotic factors in the environment affects plant's growth and survival. Plant ecophysiology is an experimental science, which studies the physiological functions and adjustments underlining the ecological observations from the viewpoint of growth and survival. Different environmental stresses restrict the plant growth. Plant ecophysiology is experimental science which studies the physiological functions and regulation mechanisms on growth, survival, abundance and distribution. Effects of abiotic and biotic factors are studied. How elevated temperature, CO₂, drought stress, nutrient imbalance, air pollutants, metals, UV radiation and plant

pathogens affect on plants' gas exchange, primary metabolism, carbon allocation and growth. The exercises can also focus on the effects of environmental factors on photosynthesis, respiration, transport of photosynthetic products, water economy, energy economy and nutrient economy. Special features of ecophysiology of boreal plants are also dealt with.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

20 h lectures and demonstrations, 35 h exercises, exam, report, seminar.

Target group:

ECOb, BSb, Ph.D. students (if not in the undergraduate degree).

Prerequisites and co-requisites:

-

Recommended optional programme components:

Course is related both to plant ecology and plant physiology basic studies.

Recommended or required reading:

Hans Lambers, F.Stuart Chapin III, Thijs L. Pons 2008: Plant Physiological Ecology. Springer Verlag. 540 s. Second edition.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Seminar and report.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Kari Taulavuori.

Working life cooperation:

No.

Other information:

-

750313A: Research training, 2 - 15 op

Opiskelumuoto: Intermediate Studies

Laji: Practical training

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

1-15 ECTS credits / 27-405 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. degree.

Learning outcomes:

Student applies the education given knowledge and skills in working life to gain hands-on experience.

Contents:

Work on special projects in the different biology research groups at the department or elsewhere or independent project work including field and/or laboratory work or work at the biological stations. The work is not included to other study modules in biology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

The topic and the study plan have to be agreed on in advance (registration form). The student has to keep diary and prepare a report on the work.

Target group:

-

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-
Recommended or required reading:

-
Assessment methods and criteria:

Report.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Prof. Markku Orell, Prof. Jari Oksanen, Prof. Outi Savolainen and Prof. Hely Häggman.

Working life cooperation:

Yes. Participating to biology project will give working life skills.

Other information:

-
750377A: Winter ecology and physiology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Taulavuori

Opintokohteen kielet: Finnish

Leikkaavuudet:

750325A Winter ecology and physiology 3.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

English.

Timing:

B.Sc. 3 rd or M.Sc. 1 st spring. NNE.

Learning outcomes:

Student obtains basic knowledge of animal and plant acclimations and adaptations to winter, and can evaluate the effects of cold temperatures and snow on overwintering, and learns central methodology in winter ecology and physiology.

Contents:

Three independent units: 1) Winter ecology and physiology course (7 h lectures and 13 h laboratory practicals and 4 h seminar in Oulu, and 4 day long field excursion to the Oulanka Research Station (total about 50 h, 3 cr); 2) Book exam on a common exam day 2 cr: Marchand, P. J. 1996: Life in the cold. An introduction to winter ecology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures, exercises, report and seminar presentation.

Target group:

Biology students.

Prerequisites and co-requisites:

Courses Basics of ecology (750124P), Field course in ecological botany (752304A), Cell biology (750121P), Field course in terrestrial animals (751306A), Field course in aquatic animals (751307A) and Basics of functional plant biology, lectures (752345A) or equivalent knowledge.

Recommended optional programme components:

-
Recommended or required reading:

Marchand, P. J. 1996: Life in the cold. An introduction to winter ecology. (3rd edition). University Press of New England. 304 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Seminar presentation and book exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Course + seminar: Pass / Fail, book exam: 1-5 / Fail.

Person responsible:

Doc. Kari Taulavuori.

Working life cooperation:

No.

Other information:

-

410067P: Basic course in education, 4 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay410067P Basic course in education (OPEN UNI) 4.0 op

ECTS Credits:

4 credits

Language of instruction:

Finnish or English

Timing:

1st year

Secondary teacher students 3rd year spring term

Learning outcomes:

After completion of the course, the student

- identifies the most important features of education as a science
- has a basic understanding of the history of education and its main areas of study
- knows how to use the basic concepts of education and pedagogy and is familiar with issues connected with them
- can relate different sectors of the educational sciences to each other
- is familiar with practical and professional tasks in the field of education and with issues connected to them.

Contents:

- basic concepts: development, bildung, teaching, pedagogical activity
- the status of scientific and practical theory in education and pedagogy
- education as a science, main areas and subareas
- history and development of education
- basics of professional growth and development
- orientation to practical tasks in education, assumption of a professional identity as a teacher and in other educational tasks.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures and other contact teaching 18 h, independent work 89 h

Target group:

Students in all programmes pursuing Basic Studies in Education

Prerequisites and co-requisites:

None

Recommended optional programme components:

This is the first course in the Basic Studies in Education (25 credits).

Recommended or required reading:

Rinne, R., Kivirauma, J. & Lehtinen, E. (eds.) (2000) Johdatus kasvatustieteisiin.

Siljander, P. (2014 or newer prints) Systemaattinen johdatus kasvatustieteeseen. Peruskäsitteet ja pääsuuntauksset.

Vastapaino.

Availability can be checked [here](#).

Assessment methods and criteria:

Exam or written assignments

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

pass/fail

Person responsible:

Pauli Siljander

Working life cooperation:

None

050081A: Basic teaching practice, 5 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Intermediate Studies**Laji:** Practical training**Vastuuyksikkö:** Faculty of Education**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**ECTS Credits:**

5 cr

Language of instruction:

Finnish

Timing:

3rd year, spring term

Learning outcomes:

- The student identifies that the operation of a school is governed by laws and other standards such as curricula.
- The student is familiarised with the teacher's job and school as a work community.
- The student internalises the wide scope of a teacher's work and working as a guide of learning.
- The student is conscious of the meaning of the curriculum as the basis of teaching in his or her subject and knows how to apply it to his or her teaching.
- The student knows how to plan, implement and evaluate teaching.
- The student applies his/her skills to encounter different learners and to keep in control of teaching situations.

Contents:

- observation and analysis of teaching
- awareness of pupil needs and observation of the working atmosphere
- school laws and the core curriculum
- familiarisation with the teaching plans of the Teacher Training School and the student's own subject
- familiarisation with the practice plan and assessment criteria
- setting personal goals for teaching practice
- planning, implementation and evaluation of teaching
- teaching methods and materials
- development of skills of interaction
- special characteristics of the student's own subject
- individual and group supervision
- educational use of ICT

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Contact teaching 70-75 h, independent work 59-64 h

Target group:

Pedagogical Studies for Secondary Teachers

Prerequisites and co-requisites:

No

Recommended optional programme components:

Pedagogical Studies for Secondary Teachers

Recommended or required reading:

Depends on subject in which the student is practising

Assessment methods and criteria:

Presence teaching, independent work

Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

Pass/fail

Person responsible:

Sari Eskola, Hellevi Kupila and Emilia Manninen

Working life cooperation:

Yes

410068P: Didactics, 4 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay410068P Didactics: (OPEN UNI) 4.0 op

ECTS Credits:

4 credits

Language of instruction:

Finnish or English

Timing:

1st year

Secondary teacher students 3rd year spring term

Learning outcomes:

After completion the students

- understand the basic concepts related to learning and teaching, their theoretical foundations and significance in practice
- understand the learning process and its cognitive, motivational and social features.
- recognize the teacher's role as a director/guider of learning and are familiar with new models of teaching
- are able to analyse the characteristics of a good learner in theory and practice and are aware of how learning skills can be taught.

Contents:

- basic concepts of learning and teaching, their theoretical foundations and significance in practice
- basic processes of learning, their cognitive, motivational and social features
- theoretical foundations of learning guidance: the teacher's role as a director of learning, models of teaching
- principles of curriculum design and planning of teaching entities
- the characteristics of a good learner in theory and in practice: how learning skills can be taught

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures and other contact teaching 18 h, independent studies 89 h

Target group:

Students in all programmes pursuing Basic Studies in Education

Prerequisites and co-requisites:

No

Recommended optional programme components:

The course is part of the Basic Studies in Education (25 cr).

Recommended or required reading:

Applicable parts:

- Hakkarainen, K. , Lonka, K. & Lipponen, L. (2004 or 2001) Tutkiva oppiminen. järki, tunteet ja kulttuuri oppimisen sytyttäjänä.
- and supplementary literature to be announced during the course.

Course material availability can be checked [here](#).

Assessment methods and criteria:

Exam or written assignments

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

pass/fail

Person responsible:

Sanna Järvelä

Outi Toropainen

Working life cooperation:

No

410069P: Educational psychology, 4 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Basic Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Education**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

ay410069P Educational psychology: (OPEN UNI) 4.0 op

ECTS Credits:

4 credits

Language of instruction:

Finnish

Timing:

1st year

Secondary teacher students 3rd year spring term

Learning outcomes:

Having completed the course, the student

- knows how to use the central concepts and identifies the main research areas and topics in educational psychology
- knows how to analyse the special nature of knowledge on educational psychology and estimate the opportunities and limitations in the application of this knowledge to educational work

Contents:

- the relationship of educational psychology to psychology and other subareas of education
- research object and basic concepts: growth, development and learning
- professional practice in educational psychology and its application to issues of growth and development at different ages

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures and other teaching 18 h, independent studies 89 h

Target group:

Students in all programmes pursuing Basic Studies in Education

Prerequisites and co-requisites:

No

Recommended optional programme components:

The course is part of the Basic Studies in Education (25 cr).

Recommended or required reading:

Applicable parts:

- Lehtinen, E., Kuusinen, J. & Vauras, M. (2007) Kasvatuspsykologia
- Soini (2016 or 2015) Johdatusta kasvatuspsykologian kysymyksiin. Opintomoniste, available in Optima.
- and additional literature to be announced during the course.

Course material availability can be checked [here](#).**Assessment methods and criteria:**

Exam or written assignments

Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

pass/fail

Person responsible:

Teemu Suorsa

Working life cooperation:

No

050091A: Optional studies, 3 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

3 cr

Language of instruction:

Finnish

Timing:

3. opintovuosi, kevätlukukausi

Learning outcomes:

Having completed the course, the student is able to describe the main contents of the course selected by him/her and apply it in his/her work as a teacher.

Contents:

Permanent and annually alternating courses that support the general goals of the pedagogical studies for teachers, offered by the Teacher Training School, Education and Subject Didactics. The aim is to arrange courses on the following fields, among others: ICT, ethics, problem-based orientation in teaching and as part of the professional identity, civics and active citizenship, environmental responsibility, multi- and interculturalism, encountering dissimilarity, multiprofessional collaboration, functional mathematics etc.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures, other contact teaching and independent work totalling 27-80 h

Target group:

Secondary teacher students

Prerequisites and co-requisites:

No

Recommended optional programme components:

Course is part of the Pedagogical Studies for Secondary Teachers

Recommended or required reading:

Varies depending on the student's choice.

Assessment methods and criteria:

To be agreed on at the start of the course.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass/fail

Person responsible:

Emilia Manninen

Working life cooperation:

No

410083P: Pedagogical seminar, 3 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

3 cr

Language of instruction:

Finnish

Timing:

3rd year, spring term

Learning outcomes:

The student

- constructs a relationship between general education studies and other contents of pedagogical studies and experiences gained in teaching practice (relationship between theory and practice)
- knows how to carry on a pedagogical discussion with the representatives of different subjects and other parties, reflecting on his or her own pedagogical theory-in-use and justifying his/her pedagogical activities
- knows how to encounter different pupils, identify the need for general, enhanced and special support and utilise in his/her work skills of pupil welfare work based on the main principles of inclusive education and the multiprofessional network as an educational and pedagogical resource
- knows the principles of pupil welfare work and the pupil welfare group and is able to make use of them to compose an individual education plan (IEP), for instance

Contents:

- orientation to educational science and its various areas and their meaning as part of a secondary teacher's professional competence
- educational thinking and pedagogical theory-in-use as part of a secondary teacher's professional competence
- orientation to issues related to facing dissimilarity at school as part of a secondary teacher's professional competence

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 8 h, small group sessions 20 h, independent work 22 h

Target group:

Secondary teacher students doing their Bachelor studies

Prerequisites and co-requisites:

None

Recommended optional programme components:

410067P Basic Course in Education

410069P Educational Psychology

410068P Didactics, Subject Didactics I

050081A Basic Practice

Recommended or required reading:

To be agreed on at the start of the course.

Assessment methods and criteria:

Active participation in teaching and practical assignments, written seminar paper

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass/fail

Person responsible:

Marko Kielenen and Markku Salakka

Working life cooperation:

None

902002Y: English 1 (Reading for Academic Purposes), 2 op

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Proficiency level:

B2/C1 on the [Common European Framework of Reference](#) scale.

Status:

This course is mandatory for students of the following degree programmes:

Faculty of Science

- Biology
- Chemistry
- Mathematical Sciences

- Physics
- Oulu Mining School**
- Geosciences degree programme
- Faculty of Information Technology and Electrical Engineering**
- Department of Information Processing Science

Students in the Department of Geography take English 3.

Engineering students in the following programmes take their English courses in the Faculty of Technology:
Oulu Mining School:

- Mining Technology and Mineral Processing degree programme

Faculty of Information Technology and Electrical Engineering

- Department of Electrical Engineering
- Department of Communications Engineering
- Department of Computer Science and Engineering

Please consult the Faculty Study Guide to establish the language requirements for your own degree program.

Required proficiency level:

English must have been the A1 or A2 language at school or equivalent English skills should have been acquired otherwise.

ECTS Credits:

2 ECTS credits (total work load 54 hours including classroom meetings.)

Language of instruction:

English

Timing:

Biology: 1st year spring term

Chemistry: 1st year autumn term

Geology: 1st year spring term

Information Processing Science: 1st year spring term

Mathematical Sciences (pedagogy): 1st year spring term

Mathematical Sciences: 2nd year autumn term

Physical Sciences: 1st year autumn term

Learning outcomes:

By the end of the course, you are expected to be able to

- have acquired effective vocabulary learning techniques
- be able to distinguish parts of words to infer meanings
- utilize your knowledge of text structure and cohesion markers to understand academic texts
- extract information and learn content from English readings in scientific and professional contexts

Contents:

The course will focus on reading strategies; these include recognizing how texts are organized, identifying key points in a text, and understanding words in context. Vocabulary work in the course will focus on a) academic vocabulary, as used in formal scientific writing, and b) using your knowledge of the meanings of parts of words (affixes) to infer meaning.

Mode of delivery:

Contact teaching

Learning activities and teaching methods:

The scope of the course is 2 op (54 hours student workload).

Target group:

1st year students of Biology, Chemistry, Geology, Information Processing Science, Physics, and Mathematics (pedagogy); 2nd year students of Mathematics

Prerequisites and co-requisites:

-

Recommended optional programme components:

Students are also required to take 902004Y Scientific Communication, which is taken AFTER completion of this course.

Recommended or required reading:

Photocopies will be provided by the teacher and/or required texts will be accessible online or from the university library.

Assessment methods and criteria:

Student work is monitored by continuous assessment. You are required to participate regularly and actively in all contact teaching provided, and successfully complete all required coursework. There will be three monthly tests on material covered so far.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass/Fail

Person responsible:

Karen Niskanen

Working life cooperation:

-

Other information:

N.B. Students with grades *laudatur* or *eximia* in their A1 English school-leaving examination can be exempted from this course and will be granted the credits by the Faculty of Science.

902004Y: English 2 (Scientific Communication), 2 op

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies**Laji:** Course**Vastuuyksikkö:** Languages and Communication**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** English**Leikkaavuudet:**

ay902004Y English 2 (Scientific Communication) (OPEN UNI) 2.0 op

Proficiency level:

B2/C1 on the CEFR scales

Status:

This course is mandatory for all 2nd year students (except **geographers**) who will have English as their foreign language in their B.Sc. degree. This includes the students who were exempted from 'Reading for Academic Purposes'(902002Y). Please consult the faculty study guide to establish the language requirements on your own degree programme.

Required proficiency level:

Students taking this course must have had English as the A1 or A2 language at school or the equivalent English skills should have been acquired otherwise. The course 'Reading for Academic Purposes' (902002Y) is a pre-requisite, unless exempted.

ECTS Credits:**The student workload is** 53 hrs work/ 2 ECTS credits.**Language of instruction:**

English

Timing:

Biology: 2nd year autumn term

Chemistry: 2nd year spring term

Geology: 2nd year spring term

Information Processing Science : 2nd year autumn term

Mathematics: 2nd year spring term

Physics: 2nd year autumn term

Learning outcomes:

By the end of the course, you are expected:

1. to have demonstrated your use of appropriate strategies and techniques for communicating effectively in English in an academic context.
2. to have demonstrated the ability to prepare and present scientific subjects to your classmates, using appropriate field-related vocabulary.

Contents:

Skills in listening, speaking, and presenting academic topics are practised in the classroom, where there is an emphasis on working in pairs and small groups. Homework tasks include online lecture listening and reading, preparation for classroom discussions and written work to support the classroom learning.

Mode of delivery:

Contact teaching

Learning activities and teaching methods:

Contact teaching 28 hours, homework 28 hours

Target group:

2nd year students of Biology, Chemistry, Geology, Information Processing Science, Mathematics, Physics

Prerequisites and co-requisites:

-

Recommended optional programme components:

Also required: [902002Y Reading for Academic Purposes Englannin kieli 1](#)

Recommended or required reading:

Course materials will be provided by the teacher.

Assessment methods and criteria:

Continuous assessment is based on regular attendance, active participation in all lessons and the successful completion of all homework tasks.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / fail.

Person responsible:

Karen Niskanen

Working life cooperation:

-

Other information:

-

750031Y: Orientation course for new students, 1 op

Voimassaolo: - 31.07.2017

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Vanhatalo, Minna-Liisa

Opintokohteen kielet: Finnish

Leikkaavuudet:

750032Y Orientation course for new students 2.0 op

ECTS Credits:

1 ECTS credit / 27 hours of work

Language of instruction:

Finnish.

Timing:

B.Sc. 1st autumn - spring.

Learning outcomes:

The aim of the course is to introduce new biology students to the university, academic studies, the department and the studies of biology, give knowledge of the social relevance of the degree programme and student is able to set own goals for the studies.

Contents:

Students orientate themselves with the help of group meetings, presentations and seminar to the academic studies. During the course students make their first personal study plan (HOPS) for the first study year.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Tutorials, presentations and seminar of major subjects, independent studying, total 30 h.

Target group:

Compulsory to the biology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Study guide.

Assessment methods and criteria:

Participation to the tutorials, presentations, seminar and doing the personal study plan for the first year.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Ph.Lic. Minna Vanhatalo.

Working life cooperation:

No.

Other information:

-

901035Y: Second Official Language (Swedish), Oral Skills, 1 op

Voimassaolo: 01.08.2014 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Opintokohteen kielet: Swedish

Leikkaavuudet:

- 901061Y Second Official Language (Swedish), Oral Skills 1.0 op
- ay901035Y Second Official Language (Swedish), Oral Skills (OPEN UNI) 1.0 op
- 901004Y Swedish 2.0 op

901034Y: Second Official Language (Swedish), Written Skills, 1 op

Voimassaolo: 01.08.2014 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Opintokohteen kielet: Swedish

Leikkaavuudet:

- 901060Y Second Official Language (Swedish), Written Skills 1.0 op
- ay901034Y Second Official Language (Swedish), Written Skills (OPEN UNI) 1.0 op
- 901004Y Swedish 2.0 op

300003Y: Activities in university and student organizations, 1 - 4 op

Voimassaolo: 01.01.2010 -

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Faculty of Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

Ei opintojaksokuvauksia.

750033Y: Tutorial for new students, 1 op

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Vanhatalo, Minna-Liisa

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

1 ECTS credit / 27 hours of work

Language of instruction:

Finnish.

Timing:

B.Sc. 3rd autumn / M.Sc. 1st autumn.

Learning outcomes:

Course develops students' skills to guide, make presentations, work in group and organize. It also advances planning, arrangement and guidance abilities as well as responsibility.

Contents:

The student guides a group of new students during the orientation course introducing them to the university, academic learning environment, the department, curriculum and other students with the help of small group meetings and presentations.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Tutorials and presentations. Minimum 15 hours. In addition independent work includes the preparation of the tutorials.

Target group:

Second and third year biology students.

Prerequisites and co-requisites:

Course 750031Y.

Recommended optional programme components:

-

Recommended or required reading:

Study guide and training material.

Assessment methods and criteria:

Tutoring report.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Ph.Lic. Minna Vanhatalo.

Working life cooperation:

No.

Other information:

-

806119P: A Second Course in Statistics, 5 op

Voimassaolo: 01.06.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opettajat: Jari Pääkkilä

Opintokohteen kielet: Finnish

Leikkaavuudet:

806113P	Introduction to Statistics A	5.0 op
806109P	Basic Methods in Statistics I	9.0 op

ECTS Credits:

5 ECTS credits

Language of instruction:

Finnish

Timing:

4th period

Learning outcomes:

Upon completion of the course, student will be able to

- analyze continuous and categorical response in the most common experimental and observational studies
- critically evaluate scientific articles
- implement and interpret analyses of a statistical software concerning issues of the course.

Contents:

- Skills for performing statistical analyses and inferences on the basis of data obtained in common experimental and observational studies are expanded and deepened
- statistical literacy of scientific articles with quantitative methods

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Total 50 h face-to-face teaching including lectures and exercise (partly computer exercises). Independent work 83 h.

Target group:

Minor students

Prerequisites and co-requisites:

The recommended prerequisite prior to enrolling for the course is the completion of the course: 806118P Introduction to Statistics or 806116P Statistics for Economic Sciences.

Recommended optional programme components:

After the course, student is able to continue other statistics courses.

Recommended or required reading:

Lecture notes

Assessment methods and criteria:

Mid-term exams and/or final exam and possible homework.

Grading:

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

Person responsible:

Jari Pääkkilä

Working life cooperation:

No

Other information:

-

780120P: Basic Principles in Chemistry, 5 op

Voimassaolo: 01.08.2016 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

780117P General and Inorganic Chemistry A 5.0 op

780109P Basic Principles in Chemistry 4.0 op

ECTS Credits:

5 credits/134 hours of work

Language of instruction:

Finnish

Timing:

1st autumn

Learning outcomes:

Upon completion of the course, the student will be able to display an understanding of basic chemistry phenomenon; equilibrium of acids and bases, chemical equilibrium, redox reactions and stoichiometry.

Contents:

Introduction to chemistry, stoichiometry, redox reactions, chemical equilibrium, the equilibrium of acid and bases, buffer solutions, titration, thermodynamics.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

40 hours of lectures and 94 hours of self-study

Target group:

Biology, Geology, Process Engineering, Environmental Engineering compulsory. Geography, optional.

Prerequisites and co-requisites:

The compulsory course in upper secondary school chemistry (1st course)

Recommended optional programme components:

The course is not included in the 25 ECTS credits entity of chemistry!

Recommended or required reading:

Tro, N.J., Principles of Chemistry. A Molecular Approach, Pearson, 3. edition, 2016

Assessment methods and criteria:

Final examination. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.

Person responsible:

Lecturer Minna Tiainen

Working life cooperation:

No

Other information:

No

030005P: Information Skills, 1 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Technology

Arvostelu: 1 - 5, pass, fail

Opettajat: Sassali, Jani Henrik, Ursula Heinikoski

Opintokohteen kielet: Finnish

Leikkaavuudet:

030004P Introduction to Information Retrieval 0.0 op

ECTS Credits:

1 ECTS credit

Language of instruction:

Finnish

Timing:

2nd or 3rd year

Learning outcomes:

Students know the different phases of information retrieval process and basic techniques of scientific information retrieval. They will find the most important reference databases of their discipline and know how to evaluate information sources and retrieval results.

Contents:

Retrieval of scientific information, the retrieval process, key databases of the discipline, and evaluation of information retrieval and information sources.

Mode of delivery:

Blended teaching: classroom training, web-based learning material and exercises in Optima environment, a final assignment on a topic of the student's own choice

Learning activities and teaching methods:

Training sessions 8h, group working 7h, self-study 12h

Target group:

Compulsory for all students of the Faculty of Technology, the Faculty of Information Technology and Electrical Engineering and the Faculty of Architecture. In the Faculty of Science compulsory for students of biology, physics, geosciences, chemistry and geography. Optional for students of biochemistry and mathematics.

Prerequisites and co-requisites:

-

Recommended optional programme components:

-

Recommended or required reading:

Web learning material <https://wiki oulu.fi/display/030005P>.

Assessment methods and criteria:

Passing the course requires participation in the training sessions and successful completion of the course assignments.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

pass/fail

Person responsible:

Science and Technology Library Tellus, tellustieto (at) oulu.fi

Working life cooperation:

-

Other information:

-

806118P: Introduction to Statistics, 5 op

Voimassaolo: 01.06.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opettajat: Jari Pääkkilä

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay806118P Introduction to Statistics (OPEN UNI) 5.0 op

806113P Introduction to Statistics A 5.0 op

ECTS Credits:

5 ECTS credits

Language of instruction:

Finnish

Timing:

3rd period

Learning outcomes:

After completing the course, student will be able to

- consider issues influencing to data collection
- describe data by appropriate methods (tables, statistics and graphical presentations)
- evaluate the effect size of the sample to the margin of error for instance in Gallup polls and in different market researches
- interpret output of a statistical software.

Contents:

- collecting data, e.g. sampling
- variables and measuring
- descriptive statistical methods and their selection
- margin of error of estimator for population mean and proportion
- statistical literacy
- basic analysis of data using statistical software

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Total 50 h face-to-face teaching including lectures and exercise (partly computer exercises). Independent work 83 h.

Target group:

Minor students

Recommended optional programme components:

After the course, student is able to continue other statistics courses.

Recommended or required reading:

Lecture notes

Assessment methods and criteria:

Mid-term exams and/or final exam and possible homework.

Grading:

Fail, 1-5

Person responsible:

Jari Pääkkilä

Working life cooperation:

No

Other information:

-

755626S: Advanced population ecology, 6 op

Voimassaolo: 01.08.2015 - 31.07.2019

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Orell, Markku Ilmari

Opintokohteen kielet: Finnish

Leikkaavuudet:

755636S Population ecology 10.0 op

755607S Population ecology 7.0 op

ECTS Credits:

6 ECTS credits / 160 hours of work.

Language of instruction:

Finnish.

Timing:

M.Sc. 1st autumn.

Learning outcomes:

Student learns central methodologies how to derive population vital parameters from various kind of long-term data to apply the information to population viability analysis. The focus is to link modeling methods to real data.

Contents:

Introduction to the mechanisms and factors, which affect the structure, size and dynamics of a population. Topics include e.g. intraspecific relationships of species, predator-prey and parasite-host interactions, competition and the structure of environment and changes in it. Information of the relations between age distribution, birth rate, mortality rate and migration of the population are needed in viability analyses of a population. The aim of the course is to initiate into the methods by which the data of individuals is leaden to the parameters describing the condition and dynamics of the population.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

30 h lectures, 30 h computer exercises, independent work, exam.

Target group:

ECO: compulsory.

Prerequisites and co-requisites:

Basics in population ecology (756351A).

Recommended optional programme components:

-

Recommended or required reading:

Supplementary reading Morris, W.F & Doak, D.F. Quantitative conservation biology. Theory and practice of population viability analysis. Akçakaya, H.R., Burgman, M.A. & Ginzburg, L.R. Applied population ecology. Principles and computer exercises using RAMAS ® EcoLab. Lande, R., Engen, S. & Sæther, B-E. Stochastic population dynamics in ecology and conservation.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Markku Orell.

Working life cooperation:

No.

Other information:

-

755630S: Community ecology, 5 op**Voimassaolo:** 01.08.2015 -**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Field of Biology**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Muotka, Timo Tapani**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

755310A Community ecology 3.0 op

755610S Community ecology 3.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B. Sc. 3 rd or M.Sc. 1 st spring, odd years.

Learning outcomes:

Students are introduced to essential concepts of modern community ecology. Course gives ability to understand ecological community research.

Contents:

Effects of biotic (e.g. interspecific competition, predation) and abiotic (e.g. environmental disturbances) factors on the structure of communities, temporal and spatial variation of community structure and species richness at different scales, detection of human impacts on biotic communities, macroecological phenomena.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

26 h lectures, computer demonstrations, seminar.

Target group:

ECO compulsory.

Prerequisites and co-requisites:

Basics of ecology (750124P).

Recommended optional programme components:

-

Recommended or required reading:

Handouts and book Mittelbach, G. G. Community Ecology (2012). Sinauer, 400 p.

The availability of the literature can be checked from [this link](#).**Assessment methods and criteria:**

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

1-5 / Fail.

Person responsible:

Prof. Timo Muotka.

Working life cooperation:

No.

Other information:

-

750656S: Final examination in biology, 10 op**Voimassaolo:** 01.08.2015 -**Opiskelumuoto:** Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

751699S	Final examination in zoology	10.0 op
752699S	Final examination in botany	10.0 op
753699S	Final examination in genetics	10.0 op

ECTS Credits:

10 ECTS credits / 267 hours of work.

Language of instruction:

Depending on the book, exam answers Finnish / English.

Timing:

M.Sc. 1st or 2nd year.

Learning outcomes:

Student will understand profoundly own major's essential methods, results and theories.

Contents:

Exam books have to be agreed with the professor in beforehand.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Book exam (4 h). Exam is held in Examinarium, instructions: <http://www oulu.fi/english/studying/examinarium>

Target group:

TEA, ECO and BS: compulsory.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Examination on selected literature of a specific subject.

Exam books has to be agreed in beforehand with the professor.

MAJOR ECOLOGY

Animal ecology orientation (prof. Markku Orell):

- Begon, M., Townsend, C.R. & Harper, J.L. 2006: Ecology. From Individuals to Ecosystems. - Blackwell, 658 p., (8 ECTS)
 - Ridley, M. 2004: Evolution - Blackwell, 198 p. (pp. 347-520 ja 590-613), (2 ECTS) OR
 - Futuyma, D.J. 2005: Evolution - Sinauer, 200 p. (chapters 2-6, 13, 15-16, 21), (2 ECTS).
- Or other literature agreed with the professor

Plant ecology orientation (prof. Jari Oksanen):

- Schultze, E.-D., Beck, E., K. Muller-Hohenstein. 2002. Plant ecology. Springer.
 - Crawford, R.M.M. 2008. Plants at the margin. Cambridge. (Professor needs a copy of the book in order to make the exam questions)
 - Keddy, P.A. Plants and Vegetation. Origin, processes, consequences. Cambridge.
 - Chapin, Matson & Mooney 2002. Principles of terrestrial ecosystem ecology. Springer.
- Or other literature agreed with the professor

MAJOR BIOSCIENCE

Genetics orientation (prof. Outi Savolainen):

- Lewin Genes (XI) (or equal)

Some part of the book can be replaced with other books for example

- Nielsen, R. ja Slatkin, M. 2013 An introduction to population genetics. Sinauer, 287 p.

Or other literature agreed with the professor, for example human genetics, quantitative genetics or bioinformatics.

Animal physiology orientation (prof. Esa Hohtola):

- Compulsory book: Willmer, Stone, Johnston: Environmental Physiology of Animals, 2nd ed, Blackwell, 754 p. 8 ECTS
- Literature related to the pro gradu thesis 200-250 pages. 2 ECTS

Plant physiology orientation (prof. Hely Häggman)

- Beeckman 2009. Root Development. Annual Plant Reviews 37. - Wiley-Blackwell. ISBN 978-1-4051-6150-3
- Coruzzi Gutierrez 2009. Plant Systems Biology. Annual Plant Reviews 35. - Wiley-Blackwell. ISBN 978-1-4051-6283-8.
- Dickison, W.C. 2000. Integrative plant anatomy. 533 s. ISBN 0-12-215170-4
- Fahn, A. 1990. Plant anatomy. 4. rev. ed. 588 s. ISBN 0-08-037490
- Gan 2007. Senescence processes in plants. - Wiley-Blackwell. ISBN 978-0-8138-1963-1
- Hayat, Mori, Pichtel & Ahmad 2010. Nitric oxide in plant physiology. - Wiley-Blackwell. ISBN 978-3-527-32519-1
- Hvoslef-Eide, A.K. & Preil, W. 2005. Liquid culture systems for in vitro plant propagation. Springer ISBN 1-4020-3199-8
- Jenks & Wood 2009. Genes for Plant Abiotic Stress. - Wiley-Blackwell. ISBN 978-1-4051-3984-7
- Knight, Perroud, Cove 2009. The Moss Physcomitrella- Annual Plant Reviews, volume 36 - Wiley-Blackwell. ISBN 978-1-4051-8189-1.
- Lambers, H., Chapin III, F.S., Pons, T.L. 2008. Plant physiological ecology. Springer. 610 p. ISBN 978-0-387-78340-6
- Osbourn, A.E. & Lanzotti, V. 2009. Plant-derived natural products: synthesis, function, and application. 587 s. Springer. (Printed or electronical book version in the library)
- Parker 2008. Molecular aspects of plant disease resistance. Annual Plant Reviews , volume 34. - Wiley-Blackwell. ISBN 978-1-4051-7532-6
- Reed, B.M. 2008. Plant Cryopreservation: A Practical Guide. Springer ISBN 978-0-387-72275-7
- Smith & Read 2008. Mycorrhizal symbiosis. 3. painos. Academic Press. 800 p.
- Taiz, L. & Zeiger, E. 2010. Plant Physiology. Fifth Edition. 782 p. Sinauer Associates, Inc. ISBN-10: 0878938664
- Wink 2010. Biochemistry of plant secondary metabolism. Annual Plant Reviews, volume 40. - Wiley-Blackwell. ISBN 978-1-4051-83970. Electronical book. Link can be found for example from OULA library catalogue. Dawsonera can be accessed with koivu/paju password. <http://www.dawsonera.com/depp/reader/protected/external/AbstractView/S9781444320510>
- Yeo & Flowers 2007. Plant Solute Transport. - Wiley-Blackwell. ISBN 978-1-4051-3995-3
- Yoshioka & Shinozaki 2009. Signal Crosstalk in Plant Stress Responses - Wiley-Blackwell. ISBN 978-0-8138-1963-1

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Book exam in biology public exam day. Read more about [assessment criteria](#) at the University of Oulu webpage.

Exam in Examinarium: <http://www.oulu.fi/english/studying/examinarium>

Grading:

1-5 / Fail.

Person responsible:

M.Sc. Henrika Honkanen, Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

750678S: Master of science seminar, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

750696S Master of science seminar 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st - 2nd year.

Learning outcomes:

The seminar gives advanced scientific communication and information retrieval skills.

Contents:

Instructions for the M.Sc. thesis and interactive reporting of the work in progress.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Student will give two seminar presentations and one research seminar and one result seminar presentation opposing, eight research seminar and eight result seminar attendances. Research plan seminar and results seminar presentations cannot be given at same day. Topics and dates have to be agreed with the professor in beforehand. See degree programme notice board for the schedule and instructions.

Target group:

Compulsory to the biology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Seminar presentations, attendance and opposing. Detailed instructions on the degree programme's notice board. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Prof. Markku Orell.

Working life cooperation:

No.

Other information:

-

750632S: Maturity exam, 0 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

0 ECTS credits / 1 hours of work.

Language of instruction:

Finnish / Swedish / English.

Timing:

M.Sc. degree.

Learning outcomes:

Student will present and analyze research material, methods and results.

Contents:

After completing the Master of Science Thesis, the student will give summary in Finnish, Swedish or English to show his/her familiarity with the topic of the thesis. If the international degree student has not done a maturity exam in her /his B.Sc. degree the student has to make a 4 pages long essay about the thesis subject in Examinarium.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Instructions at the Faculty of Science internet homepage. One teacher examine the maturity exam and Pro gradu working group accepts it.

Target group:

Compulsory to the biology students. After completing the thesis.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Summary form at the Faculty of Science internet homepage.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

750615S: Practical training, 10 - 15 op

Opiskelumuoto: Advanced Studies

Laji: Practical training

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

10-15 ECTS credits / 380-570 hours of traineeship work.

Language of instruction:

Finnish / English.

Timing:

Registration B.Sc. 3rd autumn, training B.Sc. 3rd summer - M.Sc. 1st autumn.

Learning outcomes:

The aim of the course is for students to gain work experience in their own field of biology. Student applies the theoretical knowledge gained during the studies in practice.

Contents:

Minimum training period is two months full day work 10 cr. Students can obtain 15 credits for three months versatile training depending on the length and intensity of it. Student can do the training period in Finland or during her/his exchange period or train otherwise abroad.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

The trainee has to keep a journal of the work and its background factors. This journal and a summary of 6-8 pages have to be handed in to the responsible contact person after the training period. The summary should contain information on the training place, the ongoing research, the trainee's own work and its results. The journal is returned to the student after the summary has been approved. The student has also to be given a reference of the work. Offered training placements are announced in the internet page of Extension School. Entering for the practical training is made in 3rd autumn. Normally, the student has to find him/herself a placement in public or private sectors or abroad.

Target group:

Compulsory to BS and ECO in the M.Sc. degree.

Prerequisites and co-requisites:

About 80 credit amount of biology courses.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Journal and final report.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Contact person Minna Vanhatalo. The supervisors of the practical training are Prof. Markku Orell (ECOz), Prof. Juha Tuomi (ECOb), Prof. Hely Häggman (BSb), M.Sc. Henriika Honkanen (BSz) and Prof. Outi Savolainen (BSg).

Working life cooperation:

Yes. Participating to biology project gives working life skills.

Other information:

The student has to contact the professor and discuss about the suitability of the internship place in beforehand.

750658S: Pro gradu thesis in biology, 40 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

755602S	Master of science thesis in zoology	40.0 op
756602S	Pro gradu thesis	40.0 op
757602S	Master of science thesis in genetics	40.0 op

ECTS Credits:

40 ECTS credits / 1067 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1 st or 2 nd year.

Learning outcomes:

Student knows the research methods in specific field of biology. She is conversant with her field of thesis and is able to scientific thinking, estimating the results, analysing, drawing conclusions and scientific communicating.

Contents:

Literary work which in general includes experimental research work. Student gets profoundly acquainted on certain special field in biology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Independent research work on a scientific subject in agreement with the responsible professor and under the supervision of the Department. The supervisors may be professors of the department, docents and other teachers and researchers who have the docent's status. The student may have several supervisors, the other supervisor may be from other department, university (also abroad) or from research institute. The subject must be agreed on with the professor in advance. The research work can contain fieldwork, laboratory work, theoretical work or work on collections in museum. The work always includes a literature survey. After having completed the thesis, the student writes the Maturity Exam. The programme director will order the final examiners by the proposal of the professor. Pro gradu working group accepts and grades the thesis on the basis of the final examiners' opinions.

Target group:

ECO and BS: compulsory 40 cr. TEA: 40 cr. optional. So called didactic pro gradu thesis cannot be 40 cr.

Prerequisites and co-requisites:

Sufficient amount of basic and subject level studies in order to be able to do independent research work.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Literary work.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

M.Sc. Henriika Honkanen, Prof. Hely Häggman, prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

Thesis is made in research groups.

Other information:

-

751666S: Animal behaviour, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kaitala Arja

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 3rd spring or M.Sc. 1st spring ECOz.

Learning outcomes:

To understand basic principles of animal behaviour in an evolutionary ecology context.

Contents:

The basics of behavioural ecology of animals. Lecture topics: Animal foraging, predator-pray interactions, mating systems, and social behaviour. Seminars are based on the latest research results.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

30 h lectures, seminars, final exam.

Target group:

B.Sc. degree optional to ECO, M.Sc. degree compulsory to ECOz.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Davis, NB, Krebs, JR, & West, SA N.B. (2012) An Introduction to Behavioural Ecology, 4th ed, Wiley-Blackwell.

The availability of the literature can be checked from [this link](#)

Assessment methods and criteria:

Seminar and exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Arja Kaitala.

Working life cooperation:

No.

Other information:

-

751642S: Identification of vertebrates in the field, 2 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Koivula

Opintokohteen kielet: Finnish

ECTS Credits:

2 ECTS credits / 53 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st spring.

Learning outcomes:

After having the course the students have a basic knowledge (a level expected from a professional biologist) about identification of vertebrate animals in the field.

Contents:

Identification exam on birds and mammals in the field. Their natural history: tracks, droppings, nests etc.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Independent learning, exam.

Target group:

Compulsory to ECOz.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Field exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Kari Koivula.

Working life cooperation:

No.

Other information:

-

H750700: Optional advanced level studies in ecology major, 35 - 60 op

Voimassaolo: 01.08.2016 -

Opiskelumuoto: Advanced Studies

Laji: Study module

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

300003Y: Activities in university and student organizations, 1 - 4 op

Voimassaolo: 01.01.2010 -

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Faculty of Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

Ei opintojaksokuvauksia.

300002M: Advanced Information Skills, 1 op

Voimassaolo: 01.08.2009 -

Opiskelumuoto: Other Studies

Laji: Course

Vastuuyksikkö: Faculty of Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Ursula Heinikoski

Opintokohteen kielet: Finnish

ECTS Credits:

1 ECTS credit

Language of instruction:

Finnish

Timing:

Intended for degree students working on their diploma/master's thesis. The course unit is held once in the autumn and once in the spring semester.

Learning outcomes:

Students know the different phases of scientific information retrieval process and basic techniques of systematic information search. They will find the most important reference databases of their discipline and know how to evaluate information sources and search results.

Contents:

Scientific information retrieval, evaluation of search results and information sources, information search on subject areas of diploma/master's thesis.

Mode of delivery:

Blended teaching

Learning activities and teaching methods:

Lectures 10 h, self-study 17 h

Target group:

The course is optional for students of Science and Technology.

Recommended or required reading:

Web learning material:

<http://libguides oulu.fi/tieteellinentiedonhankinta>

<http://libguides oulu.fi/julkaisujenarviointi>

Assessment methods and criteria:

Passing the course requires participation in the lectures and successful completion of the course assignments.

Grading:

pass/fail

Person responsible:

Library information specialists, informationservice(at)oulu.fi

790101P: GIS-basics and Cartography, 5 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Geography

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay790101P GIS-basics and Cartography (OPEN UNI) 5.0 op

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

5 ECTS

Language of instruction:

Finnish, partly in English. English speaking students are asked to contact prof. Rusanen before the course.

Timing:

1 year, 2nd semester (spring semester)

Learning outcomes:

Course gives basic information about Geographical Information System and about the theory of cartography. After the course the student can use ArcGIS program and he/she is able to produce cartographic presentations.

Contents:

Basics of GIS, theories of cartography and statistical graphics and use of ArcGIS program.

Mode of delivery:

Face-to-face learning.

Learning activities and teaching methods:

16 h lectures, 56 h practicals.

Target group:

Common course to all 1st year students of Geography.

Prerequisites and co-requisites:

-

Recommended optional programme components:

Course is part of the minor studies of GIS.

Recommended or required reading:

Paul A Longley, Michael G Goodchild, David J. Maguire & David W. Rhind (2005). Geographic Information Systems and Science. 2nd edition. 516 p

Assessment methods and criteria:

Exam on exam day.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1–5.

Person responsible:

Professor Rusanen

Working life cooperation:

No

Other information:

English speaking students are asked to contact prof. Rusanen before the course.

757311A: Molecular methods I, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kuittinen, Helmi Helena

Opintokohteen kielet: Finnish

Leikkaavuudet:

750364A Molecular methods I 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

BS: B.Sc. 2nd autumn, ECOGEN 1st autumn

Learning outcomes:

After the course the student is able to use the basic methods of DNA work. The student can isolate DNA from different organisms, estimate the quality and quantity of the DNA, amplify DNA fragments with the polymerase chain reaction, design PCR primers and sequence DNA. The student is able to evaluate his results and optimize methods to some degree. The student can write a simple scientific report.

Contents:

Isolation of genomic DNA, amplification of DNA with PCR, primer design, DNA sequencing with the Sanger dideoxy method from a PCR product and from a cloned material. Computer programs needed for DNA-sequence and fragment analysis. Basic elements of a scientific report.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

48 h exercises including demonstrations, 85 h independent work including homework and reports.

Target group:

Compulsory to BS, suitable for ECO students who are interested in population and evolutionary ecology.

Prerequisites and co-requisites:

Concepts of genetics (757110P) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Reports.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail

Person responsible:

Doc. Helmi Kuittinen.

Working life cooperation:

No.

Other information:

-

750033Y: Tutorial for new students, 1 op

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Vanhatalo, Minna-Liisa

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

1 ECTS credit / 27 hours of work

Language of instruction:

Finnish.

Timing:

B.Sc. 3rd autumn / M.Sc. 1st autumn.

Learning outcomes:

Course develops students' skills to guide, make presentations, work in group and organize. It also advances planning, arrangement and guidance abilities as well as responsibility.

Contents:

The student guides a group of new students during the orientation course introducing them to the university, academic learning environment, the department, curriculum and other students with the help of small group meetings and presentations.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Tutorials and presentations. Minimum 15 hours. In addition independent work includes the preparation of the tutorials.

Target group:

Second and third year biology students.

Prerequisites and co-requisites:

Course 750031Y.

Recommended optional programme components:

-

Recommended or required reading:

Study guide and training material.

Assessment methods and criteria:

Tutoring report.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Ph.Lic. Minna Vanhatalo.

Working life cooperation:

No.

Other information:

-

750656S: Final examination in biology, 10 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

751699S	Final examination in zoology	10.0 op
752699S	Final examination in botany	10.0 op
753699S	Final examination in genetics	10.0 op

ECTS Credits:

10 ECTS credits / 267 hours of work.

Language of instruction:

Depending on the book, exam answers Finnish / English.

Timing:

M.Sc. 1st or 2nd year.

Learning outcomes:

Student will understand profoundly own major's essential methods, results and theories.

Contents:

Exam books have to be agreed with the professor in beforehand.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Book exam (4 h). Exam is held in Examinarium, instructions: <http://www oulu.fi/english/studying/examinarium>

Target group:

TEA, ECO and BS: compulsory.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Examination on selected literature of a specific subject.

Exam books has to be agreed in beforehand with the professor.

MAJOR ECOLOGY

Animal ecology orientation (prof. Markku Orell):

- Begon, M., Townsend, C.R. & Harper, J.L. 2006: Ecology. From Individuals to Ecosystems. - Blackwell, 658 p., (8 ECTS)
 - Ridley, M. 2004: Evolution - Blackwell, 198 p. (pp. 347-520 ja 590-613), (2 ECTS) OR
 - Futuyma, D.J. 2005: Evolution - Sinauer, 200 p. (chapters 2-6, 13, 15-16, 21), (2 ECTS).
- Or other literature agreed with the professor

Plant ecology orientation (prof. Jari Oksanen):

- Schultze, E.-D., Beck, E., K. Muller-Hohenstein. 2002. Plant ecology. Springer.
 - Crawford, R.M.M. 2008. Plants at the margin. Cambridge. (Professor needs a copy of the book in order to make the exam questions)
 - Keddy, P.A. Plants and Vegetation. Origin, processes, consequences. Cambridge.
 - Chapin, Matson & Mooney 2002. Principles of terrestrial ecosystem ecology. Springer.
- Or other literature agreed with the professor

MAJOR BIOSCIENCE

Genetics orientation (prof. Outi Savolainen):

- Lewin Genes (XI) (or equal)

Some part of the book can be replaced with other books for example

- Nielsen, R. ja Slatkin, M. 2013 An introduction to population genetics. Sinauer, 287 p.

Or other literature agreed with the professor, for example human genetics, quantitative genetics or bioinformatics.

Animal physiology orientation (prof. Esa Hohtola):

- Compulsory book: Willmer, Stone, Johnston: Environmental Physiology of Animals, 2nd ed, Blackwell, 754 p. 8 ECTS
- Literature related to the pro gradu thesis 200-250 pages. 2 ECTS

Plant physiologi orientation (prof. Hely Häggman)

- Beeckman 2009. Root Development. Annual Plant Reviews 37. - Wiley-Blackwell. ISBN 978-1-4051-6150-3
- Coruzzi Gutierrez 2009. Plant Systems Biology. Annual Plant Reviews 35. - Wiley-Blackwell. ISBN 978-1-4051-6283-8.
- Dickison, W.C. 2000. Integrative plant anatomy. 533 s. ISBN 0-12-215170-4
- Fahn, A. 1990. Plant anatomy. 4. rev. ed. 588 s. ISBN 0-08-037490
- Gan 2007. Senescence processes in plants. - Wiley-Blackwell. ISBN 978-0-8138-1963-1
- Hayat, Mori, Pichtel & Ahmad 2010. Nitric oxide in plant physiology. - Wiley-Blackwell. ISBN 978-3-527-32519-1
- Hvoslef-Eide, A.K. & Preil, W. 2005. Liquid culture systems for in vitro plant propagation. Springer ISBN 1-4020-3199-8
- Jenks & Wood 2009. Genes for Plant Abiotic Stress. - Wiley-Blackwell. ISBN 978-1-4051-3984-7
- Knight, Perroud, Cove 2009. The Moss Physcomitrella- Annual Plant Reviews, volume 36 - Wiley-Blackwell. ISBN 978-1-4051-8189-1.
- Lambers, H., Chapin III, F.S., Pons, T.L. 2008. Plant physiological ecology. Springer. 610 p. ISBN 978-0-387-78340-6
- Osbourn, A.E. & Lanzotti, V. 2009. Plant-derived natural products: synthesis, function, and application. 587 s. Springer. (Printed or electronical book version in the library)
- Parker 2008. Molecular aspects of plant disease resistance. Annual Plant Reviews, volume 34. - Wiley-Blackwell. ISBN 978-1-4051-7532-6
- Reed, B.M. 2008. Plant Cryopreservation: A Practical Guide. Springer ISBN 978-0-387-72275-7
- Smith & Read 2008. Mycorrhizal symbiosis. 3. painos. Academic Press. 800 p.
- Taiz, L. & Zeiger, E. 2010. Plant Physiology. Fifth Edition. 782 p. Sinauer Associates, Inc. ISBN-10: 0878938664
- Wink 2010. Biochemistry of plant secondary metabolism. Annual Plant Reviews, volume 40. - Wiley-Blackwell. ISBN 978-1-4051-83970. Electronical book. Link can be found for example from OULA library catalogue. Dawsonera can be accessed with koivu/paju password. <http://www.dawsonera.com/depp/reader/protected/external/AbstractView/S9781444320510>
- Yeo & Flowers 2007. Plant Solute Transport. - Wiley-Blackwell. ISBN 978-1-4051-3995-3
- Yoshioka & Shinozaki 2009. Signal Crosstalk in Plant Stress Responses - Wiley-Blackwell. ISBN 978-0-8138-1963-1

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Book exam in biology public exam day. Read more about [assessment criteria](#) at the University of Oulu webpage.

Exam in Examinarium: <http://www.oulu.fi/english/studying/examinarium>

Grading:

1-5 / Fail.

Person responsible:

M.Sc. Henriikka Honkanen, Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

750678S: Master of science seminar, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

750696S Master of science seminar 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st - 2nd year.

Learning outcomes:

The seminar gives advanced scientific communication and information retrieval skills.

Contents:

Instructions for the M.Sc. thesis and interactive reporting of the work in progress.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Student will give two seminar presentations and one research seminar and one result seminar presentation opposing, eight research seminar and eight result seminar attendances. Research plan seminar and results seminar presentations cannot be given at same day. Topics and dates have to be agreed with the professor in beforehand. See degree programme notice board for the schedule and instructions.

Target group:

Compulsory to the biology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Seminar presentations, attendance and opposing. Detailed instructions on the degree programme's notice board. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Prof. Markku Orell.

Working life cooperation:

No.

Other information:

-

750632S: Maturity exam, 0 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

0 ECTS credits / 1 hours of work.

Language of instruction:

Finnish / Swedish / English.

Timing:

M.Sc. degree.

Learning outcomes:

Student will present and analyze research material, methods and results.

Contents:

After completing the Master of Science Thesis, the student will give summary in Finnish, Swedish or English to show his/her familiarity with the topic of the thesis. If the international degree student has not done a maturity exam in her /his B.Sc. degree the student has to make a 4 pages long essay about the thesis subject in Examinarium.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Instructions at the Faculty of Science internet homepage. One teacher examine the maturity exam and Pro gradu working group accepts it.

Target group:

Compulsory to the biology students. After completing the thesis.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Summary form at the Faculty of Science internet homepage.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

757617S: Molecular methods II, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Anna-Maria Pirttilä, Henrika Honkanen

Opintokohteen kielet: Finnish

Leikkaavuudet:

750365A Molecular methods II 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st autumn.

Learning outcomes:

The student knows how to study gene expression at different levels (transcription, translation) and understands the benefits and limitations of each method used.

Contents:

The course consists of laboratory work elaborating principles of gene expression by molecular biology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

50 h exercises including demonstrations, 50 h independent work, work reports.

Target group:

Compulsory to BS.

Prerequisites and co-requisites:

Molecular methods I (757311A).

Recommended optional programme components:

-
Recommended or required reading:

Course handout.

Assessment methods and criteria:

Demonstrations, exercises, reports.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Anna Maria Pirttilä and M.Sc. Henrika Honkanen.

Working life cooperation:

No.

Other information:

-

750615S: Practical training, 10 - 15 op

Opiskelumuoto: Advanced Studies

Laji: Practical training

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

10-15 ECTS credits / 380-570 hours of traineeship work.

Language of instruction:

Finnish / English.

Timing:

Registration B.Sc. 3rd autumn, training B.Sc. 3rd summer - M.Sc. 1st autumn.

Learning outcomes:

The aim of the course is for students to gain work experience in their own field of biology. Student applies the theoretical knowledge gained during the studies in practice.

Contents:

Minimum training period is two months full day work 10 cr. Students can obtain 15 credits for three months versatile training depending on the length and intensity of it. Student can do the training period in Finland or during her/his exchange period or train otherwise abroad.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

The trainee has to keep a journal of the work and its background factors. This journal and a summary of 6-8 pages have to be handed in to the responsible contact person after the training period. The summary should contain information on the training place, the ongoing research, the trainee's own work and its results. The journal is returned to the student after the summary has been approved. The student has also to be given a reference of the work. Offered training placements are announced in the internet page of Extension School. Entering for the practical training is made in 3rd autumn. Normally, the student has to find him/herself a placement in public or private sectors or abroad.

Target group:

Compulsory to BS and ECO in the M.Sc. degree.

Prerequisites and co-requisites:

About 80 credit amount of biology courses.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Journal and final report.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Contact person Minna Vanhatalo. The supervisors of the practical training are Prof. Markku Orell (ECOz), Prof. Juha Tuomi (ECOb), Prof. Hely Häggman (BSb), M.Sc. Henriika Honkanen (BSz) and Prof. Outi Savolainen (BSg).

Working life cooperation:

Yes. Participating to biology project gives working life skills.

Other information:

The student has to contact the professor and discuss about the suitability of the internship place in beforehand.

750658S: Pro gradu thesis in biology, 40 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

755602S	Master of science thesis in zoology	40.0 op
756602S	Pro gradu thesis	40.0 op
757602S	Master of science thesis in genetics	40.0 op

ECTS Credits:

40 ECTS credits / 1067 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1 st or 2 nd year.

Learning outcomes:

Student knows the research methods in specific field of biology. She is conversant with her field of thesis and is able to scientific thinking, estimating the results, analysing, drawing conclusions and scientific communicating.

Contents:

Literary work which in general includes experimental research work. Student gets profoundly acquainted on certain special field in biology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Independent research work on a scientific subject in agreement with the responsible professor and under the supervision of the Department. The supervisors may be professors of the department, docents and other teachers and researchers who have the docent's status. The student may have several supervisors, the other supervisor may be from other department, university (also abroad) or from research institute. The subject must be agreed on with the professor in advance. The research work can contain fieldwork, laboratory work, theoretical work or work on collections in museum. The work always includes a literature survey. After having completed the thesis, the student writes the Maturity Exam. The programme director will order the final examiners by the proposal of the professor. Pro gradu working group accepts and grades the thesis on the basis of the final examiners' opinions.

Target group:

ECO and BS: compulsory 40 cr. TEA: 40 cr. optional. So called didactic pro gradu thesis cannot be 40 cr.

Prerequisites and co-requisites:

Sufficient amount of basic and subject level studies in order to be able to do independent research work.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Literary work.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

M.Sc. Henriika Honkanen, Prof. Hely Häggman, prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

Thesis is made in research groups.

Other information:

-

757613S: Basics in population genetics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Lumi Viljakainen

Opintokohteen kielet: English

Leikkaavuudet:

753614S Basics in population genetics 8.0 op

ECTS Credits:

5 cr / 133 hours of work.

Language of instruction:

English.

Timing:

B.Sc. 2nd spring BSc, M.Sc. 1st spring, ECOGEN ECOz and ECOB BS. Introduction to Population genetics compulsory to B.Sc. in M.Sc. degree.

Learning outcomes:

This course introduces genetic theories, basics of phylogenetics and usage of molecular biology methods in ecology. The aim is that students know the basic methodology, can apply them into variety of genetic and ecological questions and is familiar with basics of population genetics and phylogenetics in order to be able to analyze and interpret genetic data.

Contents:

Basics of population genetics (variation, effective population size, bottlenecks, population structure, gene flow), relationships between molecular and adaptive variation, phylogenetic methods and phylogeography. Usage of molecular methods for identification of species, sex and individuals, behavioural ecology (mating systems, cooperation, mating success) and conservation.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

22 h lectures, 4 h seminars, 24 h exercises (problem solving, laboratory and computer exercises), take-home exam.

Target group:

Optional to BS in B.Sc. degree, compulsory to BSc and ECOGENgen in M.Sc. degree.

Prerequisites and co-requisites:

Concepts of genetics (757109P), Experimental course in general genetics (757110P) and Molecular evolution (757312A) or equivalent knowledge.

Recommended optional programme components:

Compulsory prerequisite for courses Experimental course in evolutionary genomics (757621S), Advanced course in bioinformatics (757619S) and DNA analysis in population genetics (757618S). Recommended prerequisite for course Quantitative genetics and plant and animal breeding (757616S).

Recommended or required reading:

Hamilton, M. B. 2009: Population genetics, Wiley-Blackwell.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Take-home exam, problem solving, laboratory and computer exercises, seminar.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Lumi Viljakainen.

Working life cooperation:

No.

Other information:

Note that Introduction to population genetics and Introduction to Molecular ecology courses are alternative; students cannot get credits from both.

757618S: DNA analysis in population genetics, 10 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Tanja Pyhäjärvi

Opintokohteen kielet: Finnish

Leikkaavuudet:

- | | | |
|---------|--|--------|
| 753631S | DNA analysis in population genetics, exercises | 6.0 op |
| 753616S | Specific questions in population genetic and biology | 4.0 op |

ECTS Credits:

10 cr / 267 hours of work.

Language of instruction:

English.

Timing:

M.Sc. 1st spring.

Learning outcomes:

Student is able to explain advanced theories in population genetics and analysing methods based on the theories.

Contents:

Coalescent theory, major sequence analysis methods and computer programmes in population genetics. Population structure research.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

24 h lectures, 3 h seminar, 6 h exercises, 24 h computer exercises, 60 h independent work, reports, exam.

Target group:

BTz compulsory.

Prerequisites and co-requisites:

Basics of population genetics (757313A) or Introduction to molecular ecology (756650S) and Basics of bioinformatics (757314A) is recommended.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Lectures, exercises, reports, seminar presentation, independent work.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Tanja Pyhäjärvi.

Working life cooperation:

No.

Other information:

-

752682S: Advanced course in plant biology, 9 op

Voimassaolo: - 31.07.2018

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Anna-Maria Pirttilä, Häggman, Hely Margaretha

Opintokohteen kielet: Finnish

ECTS Credits:

9 ECTS credits / 240 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st or 2nd spring, every second year.

Learning outcomes:

The student will be able to evaluate how gene expression affects plant development and metabolism, learns both holistic and specific methods of studying gene expression. She/he is also able to evaluate and analyze the reliability of the data achieved. The student will also be familiar with the most recent literature of the field.

Contents:

Due to the new sequencing technologies the amount of sequence data will increase rapidly. The course will focus on gene expression and especially on regulation of gene expression (transcription factors, RNAi, microRNAs, genome level regulation, histone acetylation, and methylation). Research methods at transcriptome, proteome and metabolome level will be included as well as qualitative and quantitative methods both at single gene level but also at global level. The exercises include methodology used in gene expression analyses. The seminars will familiarize in the most recent literature.

Mode of delivery:

Face-to-face teaching, independent studying.

Learning activities and teaching methods:

30 h lectures and seminar, 68 h exercises (demonstrations included), reports, final exam.

Target group:

BSb: compulsory MSc studies either course Advanced course in plant biology (752682S) 9 cr or Genetic transformation of plants (756625S) 8 cr.

Prerequisites and co-requisites:

Basics of plant biology lectures and exercises (756346A, 756341A) and Molecular methods I (757311A) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Jones R, Ougham H, Thomas H, Waaland S (2013) The Molecular Life of Plants, Wiley-Blackwell, ISBN 978-0-470-87012-9; Alberts, B. ym. 2014: Molecular Biology of the Cell (6e), Garland Science Publishing, London, 1464 s. ISBN: 9780815345244

The availability of the literature can be checked from this link.

Assessment methods and criteria:

Reports, / Irarnin diary / exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Hely Häggman (lectures) and Doc. Anna Maria Pirttilä (exercises), possibly guest lectures.

Working life cooperation:

Yes.

Other information:

-

752688S: Basics of tissue culture, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Häggman, Hely Margaretha, Anna-Maria Pirttilä

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 2nd or M.Sc. 1st autumn.

Learning outcomes:

The course aims to help students learn to basic plant tissue culture concepts, to establish tissue culture systems and to understand totipotency.

Contents:

Preparation of culture media and establishment of sterile cultures starting from different plant organs and tissues. Cytodifferentiation and viability tests are also included in the course. Students are able to follow how plant hormones determine the differentiation of tissues.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

8 h lectures, 35 h demonstrations and exercises, literature work, seminar.

Target group:

Optional to BS in the B.Sc. degree, compulsory to BSb in the M.Sc. degree.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

Course gives ability to further studies in molecular biology.

Recommended or required reading:

Course handout the book: Neumann K-H, Kumar A, Imani J (2009): Plant Cell and Tissue Culture – A tool in Biotechnology.

The availability of the literature can be checked from this link.

Assessment methods and criteria:

Essay, exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Hely Häggman and Doc. Anna Mari Pirttilä..

Working life cooperation:

No.

Other information:

-

756652S: Genetic transformation of plants, 5 - 8 op

Voimassaolo: 01.08.2015 - 31.12.2019

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Häggman, Hely Margaretha

Opintokohteen kielet: Finnish

Leikkaavuudet:

756625S Genetic transformation of plants 4.0 op

ECTS Credits:

5-8 ECTS credits / 133-213 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st or 2nd autumn, every second year.

Learning outcomes:

The student will assess and apply the concept of genetical modification. The student will apply the different techniques of genetic transformation and will judge their pros and cons.

Contents:

The lectures will cover gene constructs, marker-genes, different genetic transformation methods, legislation, and commercial cultivations. The exercises will familiarize the students with the most common genetic transformation methods including Agrobacterium-mediated transformation, electroporation, biolistic transformation and VIGS.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lab course + demonstrations (45 h) and lectures (20 h), reports, seminar or essay, lecture exam and final conclusions.

Target group:

BSb: compulsory MSc studies either course Advanced course in plant biology (752682S) 9 cr or Genetic transformation of plants (756625S) 8 cr.

Prerequisites and co-requisites:

Lectures of Advanced course in plant biology (752682S) helps in following the course.

Recommended optional programme components:

-

Recommended or required reading:

Lectures of Advanced course in plant biology (752682S) helps in following the course. Slater A, Scott NW, Fowler MR (2008) Plant Biotechnology, The Genetic Manipulation of Plants. Oxford, 2nd Ed. ISBN 978-0-19-928261-6. Jones R, Ougham H, Thomas H, Waaland S (2013) The Molecular Life of Plants, Wiley-Blackwell, ISBN 978-0-470-87012-9.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Report, seminar and exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Hely Häggman.

Working life cooperation:

No.

Other information:

-

751635S: Advanced course in animal physiology, 8 op

Voimassaolo: - 31.07.2019

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

8 ECTS credits / 213 hours of work.

Language of instruction:

Finnish / (English).

Timing:

M.Sc. 1st autumn.

Learning outcomes:

After completing the course the student is able to plan and execute small physiological research projects as well as analyze, interpret and report the results in scientific format. The course thus trains the student for preparing his/her master's thesis.

Contents:

The course comprises of 2-3 extensive laboratory exercises that are carried out as small research projects. The exercises can be from any area of physiology. The students will themselves plan the schedule for the experiment, and write the results in the form of a scientific publication. The report will be presented in a concluding seminar either as an oral presentation or poster.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Laboratory work, group meetings, report, writing, seminar.

Target group:

Compulsory to BSz, exchange students.

Prerequisites and co-requisites:

Animal physiology lectures and exercises (751388, 755318A), Comparative animal physiology (751x84A/S) and Laboratory, instrumentation and measurement techniques (750x22A/S).

Recommended optional programme components:

-

Recommended or required reading:

The required scientific articles and other material will be distributed during the course.

Assessment methods and criteria:

Exercises, reports and final seminar.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Prof. Esa Hohtola.

Working life cooperation:

No.

Other information:

-

751684S: Comparative animal physiology, 8 op

Voimassaolo: - 31.07.2017

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

8 ECTS credits / 213 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 3rd or M.Sc. 1st spring.

Learning outcomes:

After completing the course the student is able to form a general view of the similarities and differences in vital physiological functions between different animal species. The understanding of the regulation mechanisms of these physiological functions will be expanded by practical experiments conducted with several different animal species.

Contents:

Comparative animal physiology will be studied through the central physiological themes (nervous system, muscles, metabolism, thermoregulation, reproduction, circulation). The lectures consist of an introductory lecture on the given subject, and seminars. Physiological, cell physiological, neurophysiological, and histochemical methods are used in practical works related to the above mentioned themes. In the experiments invertebrate animals, frog, birds and mammals, including human being, will be used.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

32 h lectures, 88 h laboratory work, final exam.

Target group:

B.Sc. degree optional to BS or M.Sc. degree compulsory to BSz.

Prerequisites and co-requisites:

Cell biology (750121P) and Animal physiology (755323A, 755327A) or equivalent knowledge.

Recommended optional programme components:

Prerequisite for the course Advanced course in animal physiology (751635S).

Recommended or required reading:

Course handout. Willmer, Pat (2000) Environmental physiology of animals.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

MSc Henrika Honkanen.

Working life cooperation:

No.

Other information:

-

H750750: Optional advanced level studies in Genetics and Physiology, 35 - 60 op

Voimassaolo: 01.08.2016 -

Opiskelumuoto: Advanced Studies

Laji: Study module

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

Choose from

750653S: Special seminar in biology, 2 - 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

755616S	Seminars on special topics in zoology	2.0 op
753613S	Special seminar in genetics	4.0 op
752695S	Seminar on special topics in botany	2.0 op
753630S	Genetics research seminar	2.0 op
754618S	Research seminar in fish ecology	2.0 op

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

2-5 ECTS credits / 53-133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc., or Ph.D. degree. Arranged if resources allow.

Learning outcomes:

Students will be acquainted to current issues in biology.

Contents:

Seminars on current issues in biology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Course specific.

Target group:

Biology students.

Prerequisites and co-requisites:

Varying.

Recommended optional programme components:

-

Recommended or required reading:

Varying.

Assessment methods and criteria:

Course specific.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail or Pass / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen and docents.

Working life cooperation:

No.

Other information:

-

750654S: Special lecture in biology, 2 - 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

752667S Special topics in plant ecology 2.0 op

751690S Lectures on special topics in zoology 2.0 op

ECTS Credits:

2-5 ECTS credits / 53-133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. or Ph.D. degree. Arranged if resources allow

Learning outcomes:

Students will be acquainted to current issues in biology.

Contents:

Seminars on current issues in biology.

Mode of delivery:

Varying.

Learning activities and teaching methods:

Varying.

Target group:

Biology students.

Prerequisites and co-requisites:

Varying.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Varying.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail or Pass / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen ja dosentit.

Working life cooperation:

No.

Other information:

-

757615S: Human genetics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Savolainen Outi

Opintokohteen kielet: Finnish

Leikkaavuudet:

753607S Human genetics 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. or M.Sc. degree, autumn. Arranged if resources allow.

Learning outcomes:

To understand human evolution and man as a biological species.

Contents:

Human evolution in Africa, spread of different human species to other continents, research methods including population genetics and genomics, molecular human genetics: inherited diseases and susceptibilities.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures, home works.

Target group:

Arranged every second autumn. Course necessary for students of genetics, not compulsory. Suitable also for biochemistry students and education students.

Prerequisites and co-requisites:

Concepts of genetics (757109P) or equivalent knowledge.

Recommended optional programme components:

Educational, voluntary.

Recommended or required reading:

Jobling et al. 2014: Human evolutionary genetics. 2nd ed. Garland Science, ISBN 9780815341482.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Learning diary, controlled exam and student activity.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

757619S: Advanced course in bioinformatics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Phillip Watts

Opintokohteen kielet: Finnish

Leikkaavuudet:

753629S Advanced course in bioinformatics 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

English.

Timing:

M.Sc. 2nd spring.

Learning outcomes:

The main objective of this course is to provide students with understanding and experience of the main techniques required to manipulate, analyse and interpret next generation sequence data. Students will understand different technologies; be capable of manipulating data files and assess data quality; assemble and map reads; identify genes and variants; complete some basic analyses of genome data.

Contents:

During the course, students will manipulate an example data set to provide a comprehensive experience of contemporary bioinformatics techniques required to identify genes and polymorphisms, as well as familiarity with the command terminal and basic LINUX commands. This course builds on Basics of bioinformatics (757314A) and complements the theory learnt in Introduction to population genetics (757313A), Introduction to molecular ecology (756650S) and Experimental course in evolutionary genomics (757621S). Lectures provide the core understanding of the main steps and principals behind data analyses, but the core content will be practical experience of handling and analysing large data sets.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Contact hours: 12 hrs lectures, 40 hrs computer exercises, 56 hr independent study. Continuous assessment (coursework) and a final exam.

Target group:

Bioscience and Ecology M.Sc.

Prerequisites and co-requisites:

Basics of bioinformatics (757314A) or equivalent knowledge, Introduction to population genetics (757313A), Molecular evolution (757312A).

Recommended optional programme components:

-

Recommended or required reading:

Good guide for much of this is the De Wit P. et al 2012: The simple fool's guide to population genomics via RNA-Seq: an introduction to high-throughput sequencing data analysis. Molecular Ecology Resources. Molecular Ecology Resources. Volume 12, Issue 6, pages 1058–1067, November 2012 and other course material.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Continuous assessment, learning diary and project report.

Grading:

1-5 / Fail.

Person responsible:

Dr. Phillip Watts.

Working life cooperation:

No.

Other information:

-

757621S: Experimental course in evolutionary genomics, 5 op

Voimassaolo: 01.08.2015 - 31.07.2020

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Phillip Watts

Opintokohteen kielet: Finnish

Leikkaavuudet:

753624S Experimental course in evolutionary genomics 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

English.

Timing:

M.Sc. 2nd spring.

Learning outcomes:

After the course the student will be able to analyze DNA sequence differences between species, applying the knowledge obtained during courses in bioinformatics and molecular evolution. The student will know

how to retrieve information from public sequence databases, characterize sequences, estimate nucleotide substitutions, align sequences, build phylogenetic trees and estimate their confidence. The student will be capable of making a hypothesis related to molecular evolution and test it using sequence data.

Contents:

Sequence databases, methods and computer programs for handling and analysing sequences obtained from databases. Research appropriate scientific literature. Work is done mainly in the computer classroom.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

48 hr exercises including demonstrations and seminar, independent work including reports.

Target group:

BSg students.

Prerequisites and co-requisites:

Advanced course in bioinformatics (757619S) and Molecular evolution (757312A) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Reports, independent work and seminar.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Dr. Phillip Watts.

Working life cooperation:

No.

Other information:

-

757620S: Methods in genomics and genomics evolution, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Savolainen Outi

Opintokohteen kielet: Finnish

Leikkaavuudet:

753612S Methods in genomics and genomics evolution 6.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st autumn.

Learning outcomes:

Student knows focal features of genome structure, evolution and research methods.

Contents:

Genome structure, composition, comparative genomics, recombination and evolutionary factors affecting genome composition. Theory and methods.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

24 h lectures, 24 h seminars, independent work 83 h, exam, reports.

Target group:

BSg.

Prerequisites and co-requisites:

Concepts of genetics 5 cr (757109P), Experimental course in general genetics 5 cr (757110P) and Basics in population genetics 5 cr (757313A).

Recommended optional programme components:

-

Recommended or required reading:

Recent review articles.

Assessment methods and criteria:

Reports and exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

757616S: Quantitative genetics and plant and animal breeding, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Mikko Sillanpää

Opintokohteen kielet: Finnish

Leikkaavuudet:

753394A	Quantitative genetics and plant and animal breeding	6.0 op
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753694S	Quantitative genetics and plant and animal breeding	6.0 op
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Ei opintojaksokuvauksia.

756627S: Plant hormones, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Häggman, Hely Margaretha

Opintokohteen kielet: Finnish

ECTS Credits:

4 ECTS credits / 107 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1 st or 2 nd spring, (arranged if resources allow).

Learning outcomes:

The students will assess the plant hormone action, understand hormone interactions and the significance of the hormone balance as well as the molecular mechanisms.

Contents:

Plant hormones are signalling molecules with profound effects on growth and development at trace quantities. Until quite recently plant development was considered to be regulated by auxins, gibberellins, cytokinins, ethylene and abscisic acid. New analytical and molecular methods have evidenced new plant hormone receptors and signalling pathways. During the lectures the mode of action of the hormones and the latest literature is used to gain the most recent view of the topic.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

20 h and exam.

Target group:

Suitable for BSb and ecophysiologists.

Prerequisites and co-requisites:

Basics of functional plant biology lectures and exercises (752345A, 756341A).

Recommended optional programme components:

-

Recommended or required reading:

Chapters concerning plant hormones from Taiz, L. & Zeiger, E. 2010: Plant Physiology. Sinauer Associates Inc. 5. ed. and literature given in the lectures.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Hely Häggman.

Working life cooperation:

No.

Other information:

-

756615S: Physiology of forest trees, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Häggman, Hely Margaretha

Opintokohteen kielet: Finnish

ECTS Credits:

4 ECTS credits / 107 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st or 2nd spring, (arranged if resources allow).

Learning outcomes:

The student is able to assess the specific features of forest tree physiology and from this basis can judge the effect of climate change to forestry.

Contents:

Trees are long-living, often wind-pollinated, tall organisms. The juvenile phase may be long and the adult phase is characterized by both reproductive and vegetative growth which causes competition on both carbohydrates and nutrients. Cold- and drought resistance, water relations, carbon allocation and mineral nutrition will be discussed. Partly due to forest tree's economic importance biotechnological applications have been developed e.g. for the production of health promoting substances or vegetative propagation. Forest trees are interesting from the point of molecular biology- what makes a tree tree? The course will cover these topics but the emphasis may vary during the years.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures, literature, seminar, final exam.

Target group:

-

Prerequisites and co-requisites:

Lectures of Basics of plant biology (756346A) helps the following of the course.

Recommended optional programme components:

-

Recommended or required reading:

Literature agreed on lectures.

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Hely Häggman.

Working life cooperation:

No.

Other information:

-

756604S: Plant ecophysiology in changing environments, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Taulavuori

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 3rd or M.Sc. 1st spring.

Learning outcomes:

After finishing the course student understands interactions between plant and environment, and has become acquainted to most important experimental methods in physiological plant ecology and student can apply research parameters. Student can apply the knowledge to plant production and environmental protection issues.

Contents:

The aim of the course is to initiate the students into the basics of plant ecophysiology in changing environments. The physical, chemical (abiotic) and biotic factors in the environment affects plant's growth and survival. Plant ecophysiology is an experimental science, which studies the physiological functions and adjustments underlining the ecological observations from the viewpoint of growth and survival. Different environmental stresses restrict the plant growth. Plant ecophysiology is experimental science which studies the physiological functions and regulation mechanisms on growth, survival, abundance and distribution. Effects of abiotic and biotic factors are studied. How elevated temperature, CO₂, drought stress, nutrient imbalance, air pollutants, metals, UV radiation and plant pathogens affect on plants' gas exchange, primary metabolism, carbon allocation and growth. The exercises can also focus on the effects of environmental factors on photosynthesis, respiration, transport of photosynthetic products, water economy, energy economy and nutrient economy. Special features of ecophysiology of boreal plants are also dealt with.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

20 h lectures and demonstrations, 35 h exercises, exam and report.

Target group:

ECOb, BSb, Ph.D. students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

Course is related both to plant ecology and plant physiology basic studies.

Recommended or required reading:

Hans Lambers, F.Stuart Chapin III, Thijs L. Pons 2008: Plant Physiological Ecology. Springer Verlag. 540 s. Second edition.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Seminar and report.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Dr. Kari Taulavuori.

Working life cooperation:

No.

Other information:

-

Voimassaolo: - 31.07.2020

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Häggman, Hely Margaretha, Anna-Maria Pirttilä

Opintokohteen kielet: Finnish

ECTS Credits:

4 ECTS credits / 107 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st or 2nd spring, (arranged if resources allow).

Learning outcomes:

The student will assess the effect of abiotic and biotic stresses on plant metabolism and the means of plants to cope with them.

Contents:

The course will cover all the stresses affecting plant metabolism at biochemical or molecular level. The signal transduction caused by the stresses will be followed as well as plant defense reactions. Plant pathogen biocontrol methods are introduced.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

20 h lectures, independent exercises or seminar and exam.

Target group:

Mainly for BS but also suitable for ECO.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Lecture handouts and literature given during the course.

Assessment methods and criteria:

Exam, essay/seminar.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Hely Häggman and Doc. Anna Maria Pirttilä.

Working life cooperation:

No.

Other information:

-

756649S: Symbiosis, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Anna-Maria Pirttilä

Opintokohteen kielet: Finnish

Leikkaavuudet:

750346A Symbiosis 4.0 op

750646S Symbiosis 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. degree 3rd spring, M.Sc. 1. or 2nd spring, arranged if resources allow.

Learning outcomes:

The student knows the concept of symbiosis, understands the extent of diversity of symbiotic interactions both at the community and molecular level.

Contents:

Lately new forms of symbiosis have been discovered, extending the diversity of symbiotic interactions. Therefore the significance of symbiosis in biotechnology and for example in human health has increased. Various forms of symbiosis, their importance for the host and interaction at the molecular level are covered.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

30 h Lectures / laboratory work / demonstrations, seminar, essay, lecture diary.

Target group:

BS and ecophysiology students.

Prerequisites and co-requisites:

Studies in bioscience.

Recommended optional programme components:

-

Recommended or required reading:

Lecture notes.

Assessment methods and criteria:

Seminar, essay, lecture diary.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Anna Maria Pirttilä.

Working life cooperation:

No.

Other information:

-

750677S: Winter ecology and physiology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Taulavuori, Orell, Markku Ilmari

Opintokohteen kielet: Finnish

Leikkaavuudet:

750625S Winter ecology and physiology 3.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

English.

Timing:

B.Sc. 3 rd or M.Sc. 1 st spring. NNE.

Learning outcomes:

Student obtains basic knowledge of animal and plant acclimations and adaptations to winter, and can evaluate the effects of cold temperatures and snow on overwintering, and learns central methodology in winter ecology and physiology.

Contents:

Three independent units: 1) Winter ecology and physiology course (7 h lectures and 13 h laboratory practicals and 4 h seminar in Oulu, and 4 day long field excursion to the Oulanka Research Station (total about 50 h, 3 cr); 2) Book exam on a common exam day 2 cr: Marchand, P. J. 1996: Life in the cold. An introduction to winter ecology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures, exercises, report and seminar presentation.

Target group:

Biology students.

Prerequisites and co-requisites:

Courses Basics of ecology (750124P), Cell biology (750121P), Terrestrial animals field course (755322A), Aquatic animals field course 755321A), Field course in ecological botany (752304A) and Basics of functional plant biology, lectures (756346A) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Marchand, P. J. 1996: Life in the cold. An introduction to winter ecology. (3rd edition). University Press of New England. 304 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Seminar presentation and book exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Course + Seminar: Pass / Fail, book exam: 1-5 / Fail.

Person responsible:

Doc. Kari Taulavuori.

Working life cooperation:

No.

Other information:

-

300002M: Advanced Information Skills, 1 op

Voimassaolo: 01.08.2009 -

Opiskelumuoto: Other Studies

Laji: Course

Vastuuyksikkö: Faculty of Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Ursula Heinikoski

Opintokohteen kielet: Finnish

ECTS Credits:

1 ECTS credit

Language of instruction:

Finnish

Timing:

Intended for degree students working on their diploma/master's thesis. The course unit is held once in the autumn and once in the spring semester.

Learning outcomes:

Students know the different phases of scientific information retrieval process and basic techniques of systematic information search. They will find the most important reference databases of their discipline and know how to evaluate information sources and search results.

Contents:

Scientific information retrieval, evaluation of search results and information sources, information search on subject areas of diploma/master's thesis.

Mode of delivery:

Blended teaching

Learning activities and teaching methods:

Lectures 10 h, self-study 17 h

Target group:

The course is optional for students of Science and Technology.

Recommended or required reading:

Web learning material:

<http://libguides oulu.fi/tieteellinentiedonhankinta>

<http://libguides oulu.fi/julkaisujenarviointi>

Assessment methods and criteria:

Passing the course requires participation in the lectures and successful completion of the course assignments.

Grading:

pass/fail

Person responsible:

Library information specialists, informationservice(at)oulu.fi

750656S: Final examination in biology, 10 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

751699S Final examination in zoology 10.0 op

752699S Final examination in botany 10.0 op

753699S Final examination in genetics 10.0 op

ECTS Credits:

10 ECTS credits / 267 hours of work.

Language of instruction:

Depending on the book, exam answers Finnish / English.

Timing:

M.Sc. 1st or 2nd year.

Learning outcomes:

Student will understand profoundly own major's essential methods, results and theories.

Contents:

Exam books have to be agreed with the professor in beforehand.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Book exam (4 h). Exam is held in Examinarium, instructions: <http://www oulu.fi/english/studying/examinarium>

Target group:

TEA, ECO and BS: compulsory.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Examination on selected literature of a specific subject.

Exam books has to be agreed in beforehand with the professor.

MAJOR ECOLOGY**Animal ecology orientation (prof. Markku Orell):**

- Begon, M., Townsend, C.R. & Harper, J.L. 2006: Ecology. From Individuals to Ecosystems. - Blackwell, 658 p., (8 ECTS)
 - Ridley, M. 2004: Evolution - Blackwell, 198 p. (pp. 347-520 ja 590-613), (2 ECTS) OR
 - Futuyma, D.J. 2005: Evolution - Sinauer, 200 p. (chapters 2-6, 13, 15-16, 21), (2 ECTS).
- Or other literature agreed with the professor

Plant ecology orientation (prof. Jari Oksanen):

- Schultze, E.-D., Beck, E., K. Muller-Hohenstein. 2002. Plant ecology. Springer.
 - Crawford, R.M.M. 2008. Plants at the margin. Cambridge. (Professor needs a copy of the book in order to make the exam questions)
 - Keddy, P.A. Plants and Vegetation. Origin, processes, consequences. Cambridge.
 - Chapin, Matson & Mooney 2002. Principles of terrestrial ecosystem ecology. Springer.
- Or other literature agreed with the professor

MAJOR BIOSCIENCE**Genetics orientation (prof. Outi Savolainen):**

- Lewin Genes (XI) (or equal)

Some part of the book can be replaced with other books for example

- Nielsen, R. ja Slatkin, M. 2013 An introduction to population genetics. Sinauer, 287 p.

Or other literature agreed with the professor, for example human genetics, quantitative genetics or bioinformatics.

Animal physiology orientation (prof. Esa Hohtola):

- Compulsory book: Willmer, Stone, Johnston: Environmental Physiology of Animals, 2nd ed, Blackwell, 754 p. 8 ECTS
- Literature related to the pro gradu thesis 200-250 pages. 2 ECTS

Plant physiologi orientation (prof. Hely Häggman)

- Beeckman 2009. Root Development. Annual Plant Reviews 37. - Wiley-Blackwell. ISBN 978-1-4051-6150-3
- Coruzzi Gutierrez 2009. Plant Systems Biology. Annual Plant Reviews 35. - Wiley-Blackwell. ISBN 978-1-4051-6283-8.
- Dickison, W.C. 2000. Integrative plant anatomy. 533 s. ISBN 0-12-215170-4
- Fahn, A. 1990. Plant anatomy. 4. rev. ed. 588 s. ISBN 0-08-037490
- Gan 2007. Senescence processes in plants. - Wiley-Blackwell. ISBN 978-0-8138-1963-1
- Hayat, Mori, Pichtel & Ahmad 2010. Nitric oxide in plant physiology. - Wiley-Blackwell. ISBN 978-3-527-32519-1
- Hvoslef-Eide, A.K. & Preil, W. 2005. Liquid culture systems for in vitro plant propagation. Springer ISBN 1-4020-3199-8
- Jenks & Wood 2009. Genes for Plant Abiotic Stress. - Wiley-Blackwell. ISBN 978-1-4051-3984-7
- Knight, Perroud, Cove 2009. The Moss Physcomitrella- Annual Plant Reviews, volume 36 - Wiley-Blackwell. ISBN 978-1-4051-8189-1.
- Lambers, H., Chapin III, F.S., Pons, T.L. 2008. Plant physiological ecology. Springer. 610 p. ISBN 978-0-387-78340-6

- Osbourn, A.E. & Lanzotti, V. 2009. Plant-derived natural products: synthesis, function, and application. 587 s. Springer. (Printed or electronical book version in the library)
- Parker 2008. Molecular aspects of plant disease resistance. Annual Plant Reviews , volume 34. - Wiley-Blackwell. ISBN 978-1-4051-7532-6
- Reed, B.M. 2008. Plant Cryopreservation: A Practical Guide. Springer ISBN 978-0-387-72275-7
- Smith & Read 2008. Mycorrhizal symbiosis. 3. painos. Academic Press. 800 p.
- Taiz, L. & Zeiger, E. 2010. Plant Physiology. Fifth Edition. 782 p. Sinauer Associates, Inc. ISBN-10: 0878938664
- Wink 2010. Biochemistry of plant secondary metabolism. Annual Plant Reviews, volume 40. - Wiley-Blackwell. ISBN 978-1-4051-83970. Electronical book. Link can be found for example from OULA library catalogue. Dawsonera can be accessed with koivu/paju password. <http://www.dawsonera.com/depp/reader/protected/external/AbstractView/S9781444320510>
- Yeo & Flowers 2007. Plant Solute Transport. - Wiley-Blackwell. ISBN 978-1-4051-3995-3
- Yoshioka & Shinozaki 2009. Signal Crosstalk in Plant Stress Responses - Wiley-Blackwell. ISBN 978-0-8138-1963-1

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Book exam in biology public exam day. Read more about [assessment criteria](#) at the University of Oulu webpage.

Exam in Examinarium: <http://www.oulu.fi/english/studying/examinarium>

Grading:

1-5 / Fail.

Person responsible:

M.Sc. Henrika Honkanen, Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

750678S: Master of science seminar, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

750696S Master of science seminar 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st - 2nd year.

Learning outcomes:

The seminar gives advanced scientific communication and information retrieval skills.

Contents:

Instructions for the M.Sc. thesis and interactive reporting of the work in progress.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Student will give two seminar presentations and one research seminar and one result seminar presentation opposing, eight research seminar and eight result seminar attendances. Research plan seminar and results seminar presentations cannot be given at same day. Topics and dates have to be agreed with the professor in beforehand. See degree programme notice board for the schedule and instructions.

Target group:

Compulsory to the biology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-
Recommended or required reading:

-
Assessment methods and criteria:

Seminar presentations, attendance and opponenenting. Detailed instructions on the degree programme's notice board. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Prof. Markku Orell.

Working life cooperation:

No.

Other information:

-

750632S: Maturity exam, 0 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

0 ECTS credits / 1 hours of work.

Language of instruction:

Finnish / Swedish / English.

Timing:

M.Sc. degree.

Learning outcomes:

Student will present and analyze research material, methods and results.

Contents:

After completing the Master of Science Thesis, the student will give summary in Finnish, Swedish or English to show his/her familiarity with the topic of the thesis. If the international degree student has not done a maturity exam in her /his B.Sc. degree the student has to make a 4 pages long essay about the thesis subject in Examinarium.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Instructions at the Faculty of Science internet homepage. One teacher examine the maturity exam and Pro gradu working group accepts it.

Target group:

Compulsory to the biology students. After completing the thesis.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Summary form at the Faculty of Science internet homepage.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

750658S: Pro gradu thesis in biology, 40 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

755602S Master of science thesis in zoology 40.0 op

756602S Pro gradu thesis 40.0 op

757602S Master of science thesis in genetics 40.0 op

ECTS Credits:

40 ECTS credits / 1067 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1 st or 2 nd year.

Learning outcomes:

Student knows the research methods in specific field of biology. She is conversant with her field of thesis and is able to scientific thinking, estimating the results, analysing, drawing conclusions and scientific communicating.

Contents:

Literary work which in general includes experimental research work. Student gets profoundly acquainted on certain special field in biology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Independent research work on a scientific subject in agreement with the responsible professor and under the supervision of the Department. The supervisors may be professors of the department, docents and other teachers and researchers who have the docent's status. The student may have several supervisors, the other supervisor may be from other department, university (also abroad) or from research institute. The subject must be agreed on with the professor in advance. The research work can contain fieldwork, laboratory work, theoretical work or work on collections in museum. The work always includes a literature survey. After having completed the thesis, the student writes the Maturity Exam. The programme director will order the final examiners by the proposal of the professor. Pro gradu working group accepts and grades the thesis on the basis of the final examiners' opinions.

Target group:

ECO and BS: compulsory 40 cr. TEA: 40 cr. optional. So called didactic pro gradu thesis cannot be 40 cr.

Prerequisites and co-requisites:

Sufficient amount of basic and subject level studies in order to be able to do independent research work.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Literary work.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

M.Sc. Henrika Honkanen, Prof. Hely Häggman, prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

Thesis is made in research groups.

Other information:

-

H750900: Subject teacher's optional advanced level studies in ecology major, 5 - 80 op

Voimassaolo: 01.08.2016 -

Opiskelumuoto: Advanced Studies

Laji: Study module

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

Choose from

750615S: Practical training, 10 - 15 op

Opiskelumuoto: Advanced Studies

Laji: Practical training

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

10-15 ECTS credits / 380-570 hours of traineeship work.

Language of instruction:

Finnish / English.

Timing:

Registration B.Sc. 3rd autumn, training B.Sc. 3rd summer - M.Sc. 1st autumn.

Learning outcomes:

The aim of the course is for students to gain work experience in their own field of biology. Student applies the theoretical knowledge gained during the studies in practice.

Contents:

Minimum training period is two months full day work 10 cr. Students can obtain 15 credits for three months versatile training depending on the length and intensity of it. Student can do the training period in Finland or during her/his exchange period or train otherwise abroad.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

The trainee has to keep a journal of the work and its background factors. This journal and a summary of 6-8 pages have to be handed in to the responsible contact person after the training period. The summary should contain information on the training place, the ongoing research, the trainee's own work and its results. The journal is returned to the student after the summary has been approved. The student has also to be given a reference of the work. Offered training placements are announced in the internet page of Extension School. Entering for the practical training is made in 3rd autumn. Normally, the student has to find him/herself a placement in public or private sectors or abroad.

Target group:

Compulsory to BS and ECO in the M.Sc. degree.

Prerequisites and co-requisites:

About 80 credit amount of biology courses.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Journal and final report.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Contact person Minna Vanhatalo. The supervisors of the practical training are Prof. Markku Orell (ECOz), Prof. Juha Tuomi (ECOb), Prof. Hely Häggman (BSb), M.Sc. Henriikka Honkanen (BSz) and Prof. Outi Savolainen (BSg).

Working life cooperation:

Yes. Participating to biology project gives working life skills.

Other information:

The student has to contact the professor and discuss about the suitability of the internship place in beforehand.

755626S: Advanced population ecology, 6 op

Voimassaolo: 01.08.2015 - 31.07.2019

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Orell, Markku Ilmari

Opintokohteen kielet: Finnish

Leikkaavuudet:

755636S	Population ecology	10.0 op
755607S	Population ecology	7.0 op

ECTS Credits:

6 ECTS credits / 160 hours of work.

Language of instruction:

Finnish.

Timing:

M.Sc. 1st autumn.

Learning outcomes:

Student learns central methodologies how to derive population vital parameters from various kind of long-term data to apply the information to population viability analysis. The focus is to link modeling methods to real data.

Contents:

Introduction to the mechanisms and factors, which affect the structure, size and dynamics of a population. Topics include e.g. intraspecific relationships of species, predator-prey and parasite-host interactions, competition and the structure of environment and changes in it. Information of the relations between age distribution, birth rate, mortality rate and migration of the population are needed in viability analyses of a population. The aim of the course is to initiate into the methods by which the data of individuals is leaden to the parameters describing the condition and dynamics of the population.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

30 h lectures, 30 h computer exercises, independent work, exam.

Target group:

ECO: compulsory.

Prerequisites and co-requisites:

Basics in population ecology (756351A).

Recommended optional programme components:

-

Recommended or required reading:

Supplementary reading Morris, W.F & Doak, D.F. Quantitative conservation biology. Theory and practice of population viability analysis. Akçakaya, H.R., Burgman, M.A. & Ginzburg, L.R. Applied population ecology. Principles and computer exercises using RAMAS @ EcoLab. Lande, R., Engen, S. & Sæther, B-E. Stochastic population dynamics in ecology and conservation. The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Markku Orell.

Working life cooperation:

No.

Other information:

-

755630S: Community ecology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Muotka, Timo Tapani

Opintokohteen kielet: Finnish

Leikkaavuudet:

755310A	Community ecology	3.0 op
755610S	Community ecology	3.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B. Sc. 3 rd or M.Sc. 1 st spring, odd years.

Learning outcomes:

Students are introduced to essential concepts of modern community ecology. Course gives ability to understand ecological community research.

Contents:

Effects of biotic (e.g. interspecific competition, predation) and abiotic (e.g. environmental disturbances) factors on the structure of communities, temporal and spatial variation of community structure and species richness at different scales, detection of human impacts on biotic communities, macroecological phenomena.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

26 h lectures, computer demonstrations, seminar.

Target group:

ECO compulsory.

Prerequisites and co-requisites:

Basics of ecology (750124P).

Recommended optional programme components:

-

Recommended or required reading:

Handouts and book Mittelbach, G. G. Community Ecology (2012). Sinauer, 400 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Timo Muotka.

Working life cooperation:

No.

Other information:

-

751642S: Identification of vertebrates in the field, 2 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Koivula

Opintokohteen kielet: Finnish

ECTS Credits:

2 ECTS credits / 53 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st spring.

Learning outcomes:

After having the course the students have a basic knowledge (a level expected from a professional biologist) about identification of vertebrate animals in the field.

Contents:

Identification exam on birds and mammals in the field. Their natural history: tracks, droppings, nests etc.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Independent learning, exam.

Target group:

Compulsory to ECOz.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Field exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

1-5 / Fail.

Person responsible:

Doc. Kari Koivula.

Working life cooperation:

No.

Other information:

-

751666S: Animal behaviour, 5 op**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Field of Biology**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Kaitala Arja**Opintokohteen kielet:** Finnish**ECTS Credits:**

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:B.Sc. 3rd spring or M.Sc. 1st spring ECOz.**Learning outcomes:**

To understand basic principles of animal behaviour in an evolutionary ecology context.

Contents:

The basics of behavioural ecology of animals. Lecture topics: Animal foraging, predator-pray interactions, mating systems, and social behaviour. Seminars are based on the latest research results.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

30 h lectures, seminars, final exam.

Target group:

B.Sc. degree optional to ECO, M.Sc. degree compulsory to ECOz.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Davis, NB, Krebs, JR, & West, SA N.B. (2012) An Introduction to Behavioural Ecology, 4th ed, Wiley-Blackwell.

The availability of the literature can be checked from [this link](#)**Assessment methods and criteria:**

Seminar and exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Arja Kaitala.

Working life cooperation:

No.

Other information:

-

750653S: Special seminar in biology, 2 - 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

755616S Seminars on special topics in zoology 2.0 op

753613S Special seminar in genetics 4.0 op

752695S Seminar on special topics in botany 2.0 op

753630S Genetics research seminar 2.0 op

754618S Research seminar in fish ecology 2.0 op

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

2-5 ECTS credits / 53-133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc., or Ph.D. degree. Arranged if resources allow.

Learning outcomes:

Students will be acquainted to current issues in biology.

Contents:

Seminars on current issues in biology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Course specific.

Target group:

Biology students.

Prerequisites and co-requisites:

Varying.

Recommended optional programme components:

-

Recommended or required reading:

Varying.

Assessment methods and criteria:

Course specific.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail or Pass / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen and docents.

Working life cooperation:

No.

Other information:

-

750654S: Special lecture in biology, 2 - 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

752667S Special topics in plant ecology 2.0 op

751690S Lectures on special topics in zoology 2.0 op

ECTS Credits:

2-5 ECTS credits / 53-133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. or Ph.D. degree. Arranged if resources allow

Learning outcomes:

Students will be acquainted to current issues in biology.

Contents:

Seminars on current issues in biology.

Mode of delivery:

Varying.

Learning activities and teaching methods:

Varying.

Target group:

Biology students.

Prerequisites and co-requisites:

Varying.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Varying.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail or Pass / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen ja dosentit.

Working life cooperation:

No.

Other information:

-

757619S: Advanced course in bioinformatics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Phillip Watts

Opintokohteen kielet: Finnish

Leikkaavuudet:

753629S Advanced course in bioinformatics 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

English.

Timing:

M.Sc. 2nd spring.

Learning outcomes:

The main objective of this course is to provide students with understanding and experience of the main techniques required to manipulate, analyse and interpret next generation sequence data. Students will understand different technologies; be capable of manipulating data files and assess data quality; assemble and map reads; identify genes and variants; complete some basic analyses of genome data.

Contents:

During the course, students will manipulate an example data set to provide a comprehensive experience of contemporary bioinformatics techniques required to identify genes and polymorphisms, as well as familiarity with the command terminal and basic LINUX commands. This course builds on Basics of bioinformatics (757314A) and complements the theory learnt in Introduction to population genetics (757313A), Introduction to molecular ecology (756650S) and Experimental course in evolutionary genomics (757621S). Lectures provide the core understanding of the main steps and principals behind data analyses, but the core content will be practical experience of handling and analysing large data sets.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Contact hours: 12 hrs lectures, 40 hrs computer exercises, 56 hr independent study. Continuous assessment (coursework) and a final exam.

Target group:

Bioscience and Ecology M.Sc.

Prerequisites and co-requisites:

Basics of bioinformatics (757314A) or equivalent knowledge, Introduction to population genetics (757313A), Molecular evolution (757312A).

Recommended optional programme components:

-

Recommended or required reading:

Good guide for much of this is the De Wit P. et al 2012: The simple fool's guide to population genomics via RNA-Seq: an introduction to high-throughput sequencing data analysis. Molecular Ecology Resources. Molecular Ecology Resources. Volume 12, Issue 6, pages 1058–1067, November 2012 and other course material.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Continuous assessment, learning diary and project report.

Grading:

1-5 / Fail.

Person responsible:

Dr. Phillip Watts.

Working life cooperation:

No.

Other information:

-

756648S: Ecological responses to global change and air pollution in the subarctic, 5 - 8 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Taulavuori

Opintokohteen kielet: Finnish

Leikkaavuudet:

750643S Ecological responses to global change and air pollution in the subarctic 4.0 op

ECTS Credits:

5 (- 8) cr / 133 (- 240) hours of work.

Language of instruction:

Finnish / English.

Timing:

B. Sc. / M. Sc. / Ph.D., (excursion arranged if resources allow).

Learning outcomes:

Student can identify the ecological and environmental effects of climate change and air pollution in the subarctic area. In addition, the student may learn basic research methods related to topic, and how to use the facilities provided by the subarctic research stations in the research.

Contents:

Lectures deal the ecological responses of global change and air pollution. The content is focused on the environmental effects and their ecological significance in the northern areas. During excursion the student familiarizes with the special features of northern areas and explores the action and research carried out in the northern research stations.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

1) 24 h lectures with exam, and 15 h independent studies (essay and seminar work) (4 cp); **(2)** 4-5 days summer excursion and closing seminar (3 cp); participation in excursion necessitates accepted credits in the first part (lectures, independent studies).

Target group:

Ecology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-ACIA (2005) Arctic Climate Impact Assessment, Cambridge University Press, 1042 p. -AMAP Assessment 2006: Acidifying Pollutants, Arctic Haze, and Acidification in the Arctic. Arctic Monitoring and Assessment Programme (AMAP), Oslo, Norway. Xii + 112pp. Bell JNB & Trehow M (eds.) 2002. Air pollution and plant life. Wiley. 2nd edition. 480 pages.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Lectures, essay and seminar, excursion, closing report and seminar.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail

Read more about [assessment criteria](#) at the University of Oulu webpage.

Person responsible:

Doc. Kari Taulavuori.

Working life cooperation:

Possible excursion will include tours to the norther research stations.

Other information:

Field excursion is arranged if resources allow.

754626S: Field methods in freshwater biomonitoring, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Muotka, Timo Tapani

Opintokohteen kielet: Finnish

Leikkaavuudet:

754616S Field methods in freshwater biomonitoring 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

M.Sc. 1.-2. year. Arranged if resources allow.

Learning outcomes:

The course familiarises students with methods used in biomonitoring of lakes and rivers.

Contents:

Sampling methods as well as biological and ecotoxicological laboratory analysis are practiced. Survey methods used to describe the state of habitats are applied to lake and river environments.

Mode of delivery:

Blended teaching.

Learning activities and teaching methods:

10 h lectures, 30 h field and laboratory exercises, group works.

Target group:

ECOz, ECOb.

Prerequisites and co-requisites:

Field course in aquatic animals (755321A) and Basic course in hydrobiology (754322A) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Internet material, sample taking standards and instructions.

Assessment methods and criteria:

Group work.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Prof. Timo Muotka.

Working life cooperation:

No.

Other information:

-

751651S: Advanced identification in animals, 4 - 8 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

4-8 ECTS credits / 107-213 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st autumn.

Learning outcomes:

Student is able to identify special animal groups or species from museum samples and know the ecology and distribution in Finland.

Contents:

Identification of special animal groups (fishes; amphibian and reptiles; birds; mammals; some group of invertebrates), their ecology and distribution.

Student can get 5 cr from passed ornithological station bird ringing exam.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Independent study, oral final exam.

Target group:

ECOe.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Suomen eläimet 1-3; Suomen luonto: Linnut; Nisäkkäät; Kalat, Saimakkoeläimet ja matelijat, Koli, L.: Suomen kalat, Siivonen, L. & Sulkava, S.: Pohjolan nisäkkäät or relevant literature in English. The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Oral exam or ornithological station bird ringing exam.
Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Markku Orell.

Working life cooperation:

No.

Other information:

-

751660S: Preparation of an insect collection, 2 - 6 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Marko Mutanen

Opintokohteen kielet: Finnish

ECTS Credits:

2-6 ECTS credits / 53-160 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. degree.

Learning outcomes:

Preparation (including labels) and identification of self-collected insects.

Contents:

Preparation of a collection on one insect order. The specimens have to be preserved adequately, identified and provided with labels. In consultation with the responsible teacher.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Independent studying.

Target group:

-

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Literature related to the topic.

Assessment methods and criteria:

Collection is delivered to the person in responsible.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Doc. Marko Mutanen.

Working life cooperation:

No.

Other information:

-

756650S: Introduction to molecular ecology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kvist, Laura Irmeli, Tanja Pyhäjärvi

Opintokohteen kielet: English

Leikkaavuudet:

750645S Molecular ecology 2.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

English.

Timing:

B.Sc. 2nd spring BSc, M.Sc. 1st spring, ECOGEN ECO and BS. Introduction to Population genetics compulsory to B.Sc. in M.Sc. degree.

Learning outcomes:

This course introduces genetic theories, basics of phylogenetics and usage of molecular biology methods in ecology. The aim is that students know the basic methodology, can apply them into variety of genetic and ecological questions and is familiar with basics of population genetics and phylogenetics in order to be able to analyze and interpret genetic data.

Contents:

Basics of population genetics (variation, effective population size, bottlenecks, population structure, gene flow), relationships between molecular and adaptive variation, phylogenetic methods and phylogeography. Usage of molecular methods for identification of species, sex and individuals, behavioural ecology (mating systems, cooperation, mating success) and conservation.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Population genetics: 20 h lectures, 4 h seminars, 24 h exercises (problem solving, laboratory and computer exercises), report, essays, home exam, final exam.

Molecular ecology: 20 h lectures, 4 h seminars, 36 h exercises (laboratory and computer exercises), final exam.

Target group:

B.Sc.: BS optional 2nd spring; M.Sc.: 1st spring BSc compulsory. ECOGEN: BS and ECO.

Prerequisites and co-requisites:

Concepts of genetics (757109P) and Experimental course in general genetics (757110P) and Molecular evolution (757312A) or equivalent knowledge.

Recommended optional programme components:

Population genetics BS: Recommended prerequisite for course Quantitative genetics and plant and animal breeding (757616S). Compulsory prerequisite for courses Experimental course in evolutionary genomics (757621S), Advanced course in bioinformatics (757619S) and DNA analysis in population genetics (757618S).

Molecular ecology ECO: Basics in population ecology (756351A) and Advanced course in population ecology (755626S).

Recommended or required reading:

Hedrick 2005: Genetics of populations 3. or 4. ed. Beebe, T and Rowe G.2004 or 2008. An introduction to molecular ecology. Oxford University Press.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Population genetics: Home exam, final exam, seminar, essays, reports.

Molecular ecology: Final exam and seminar.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Laura Kvist and Doc. Tanja Pyhäjärvi.

Working life cooperation:

No.

Other information:

Note that Introduction to Molecular ecology and Introduction to population genetics courses are alternative; students cannot get credits from both.

752642S: Field course in arctic-alpine ecology and vegetation, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Virtanen, Risto Juhani

Opintokohteen kielet: Finnish

ECTS Credits:

4 ECTS credits / 107 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 2 nd or 3 rd autumn. M.Sc. 1 st or 2 nd autumn. Every second year at the Kilpisjärvi biological station. Arranged if resources allow.

Learning outcomes:

By passing this course a student is able to identify plant and animal species, nature types, vegetation of NW Fennoscandian mountain areas, understand ecology of northern ecosystems, ecological interactions and adaptation. Advanced training in experimental and observational field research.

Contents:

Arctic-alpine ecosystems as one the main biomes of the world. Plant and animal species of arctic-alpine areas. Vegetation and ecology of NW Fennoscandian mountain areas. Plant-herbivore interactions in tundra ecosystems.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Field course.

Target group:

Ecology students.

Prerequisites and co-requisites:

Field course in ecological botany (756343A) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Disseminated during course, internet resources. Literature on arctic-alpine ecosystems. The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Field course, field exercise. Planning of the study, field work and analyzing data. Making a report with reference to scientific literature. Oral presentation of the study (Power Point). Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Field exam including questions about the species and arctic-alpine nature. Pass / Fail.

Person responsible:

Doc. Risto Virtanen.

Working life cooperation:

No.

Other information:

Arranged with cooperation of the University of Eastern Finland.

752692S: Mire ecology, 5 op

Voimassaolo: 01.08.2003 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Virtanen, Risto Juhani

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay752692S Mire ecology 5.0 op

ECTS Credits:

4 ECTS credits / 107 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 2 nd or 3 rd autumn. M.Sc. 1 st or 2 nd autumn. Every second year at the Oulanka research station. Arranged if resources allow.

Learning outcomes:

By passing this course a student is able to identify plant species (bryophytes and vascular plants), mire types, vegetation of boreal areas, species indicator values, determine mire types, interpret ecology of mire systems and make inventories on mire landscapes.

Contents:

Plant species (bryophytes and vascular plants), mire types, vegetation of boreal areas. Regional patterns in mire vegetation, mire types and underlying ecological gradients. Mire hydrotopography and peat stratigraphy. Red list status of mire vegetation.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures 9 h, field course, demonstrations and field exercises 47 h.

Target group:

Plant ecology students.

Prerequisites and co-requisites:

Field course in ecological botany (756343A) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Eurola, S., Huttunen, A. & Kukko-oja, K. 1995: Suokasvillisuusopas. Oulanka Reports 14: 1-85 ja Eurola, S., Bendiksen, K. & Rönkä, A. 1990: Suokasviopas. Oulanka Reports 9: 1-205.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Mire type and species exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Mire types and species exam. 1-5 / Fail.

Person responsible:

Doc. Risto Virtanen.

Working life cooperation:

No.

Other information:

Organised together with the University of Eastern Finland.

752616S: Macro fungi, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

3 ECTS credits / 80 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 3rd autumn. NNE.

Learning outcomes:

Student is able to identify most common macrofungal species as fresh specimens and knows basics of fungal ecology.

Contents:

Demonstrations of macrofungi in the field, basics of identification, ecology and distribution.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

14 h lectures, 25 h exercises including excursions, identification exam.

Target group:

Optional course.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Course handout, Salo, P. and Nummela-Salo, U. 2002: Sienikurssi (752316). Toinen uusittu painos. Lajiesittelyt. Biologian laitoksen monisteita 2/2002, 41 p. and mushroom guides. The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Species exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Annamari Markkola.

Working life cooperation:

No.

Other information:

-

752656S: Taxonomy and ecology of plants, 2 - 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

2-4 ECTS credits / 53-107 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st or 2nd year. Arranged if resources allow every second year. See WebOodi.

Learning outcomes:

By passing this course a student is able to identify species of the given taxonomic group, understand the ecology of the species, and know their distribution and systematic position.

Contents:

A laboratory course, field course or blended course. Species identification by means of macroscopic or microscopic characters. Making a collection of specimens, sampling and handling of the material. Preparation of herbarium specimens. Field instruction on species mapping and quantitative approach. Species' characters (morphological and chemical). Inventory methods on red listed species. Alternative themes (lichens, polypores and other fungi, and bryophytes).

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Demonstrations, identification exercises and field exercises.

Target group:

Students of plant ecology.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Material given in the course.

Assessment methods and criteria:

Species exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

doc. Anna Liisa Ruotsalainen.

Working life cooperation:

No.

Other information:

Course subject vary (lichens, polypore and other fungi, bryophytes).

752608S: Advanced identification of plant species I, 6 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Anna Ruotsalainen

Opintokohteen kielet: Finnish

ECTS Credits:

6 ECTS credits / 160 hours of work.

Language of instruction:

Finnish / English

Timing:

B.Sc. 3rd year, M.Sc. 1st year.

Learning outcomes:

Advanced identification of the vascular plants of Finland.

Contents:

Independent studying of herbarium samples. Distribution types of plants in Fennoscandia excluding the Russian parts.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Independent studying of herbarium samples. The course could be examined in two parts: 1) monocots, 2) ferns, dicots and distributions.

Target group:

-

Prerequisites and co-requisites:

Identification of plant species, extensive (756354A) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Hämet-Ahti et al. 1998: Retkeilykasvio (Field Flora of Finland), Ed. 4. Finnish Museum of Natural History, Helsinki. 656 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Species exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Anna Liisa Ruotsalainen.

Working life cooperation:

No.

Other information:

-

752625S: Advanced identification of plant species II, 5 - 8 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Anna Ruotsalainen

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

5-8 ECTS credits / 133-213 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st or 2nd year.

Learning outcomes:

Identification of systematically or ecologically limited groups. For example macrofungi, mosses, lichens, phytoplankton, aquatic, shore, forest, meadow, peatland or fell plants, species of primeval forest and macroscopic plant remains.

Contents:

Identification of systematically or ecologically limited groups from herbarium samples and preparates. Lichens 8 cr., others 5 cr.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Independent studying of herbarium samples or preparations, species exam.

Target group:

Ecology students.

Prerequisites and co-requisites:

Identification of plant species (756342A).

Recommended optional programme components:

-

Recommended or required reading:

Literature related to the topic.

Assessment methods and criteria:

Species exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Anna Liisa Ruotsalainen.

Working life cooperation:

No.

Other information:

-

752672S: Distribution mapping of plants, 2 - 5 op

Voimassaolo: - 31.07.2019

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

2-5 ECTS credits / 53-133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 3rd summer or M.Sc. 1st or 2nd summer.

Learning outcomes:

Train oneself in floristic mapping skills.

Contents:

Floristic mapping of plants with special emphasis on endangered species. Participant should agree with the Botanical Museum in advance. Field work in the provinces of Oulu and Lapland, including sample collection, identification, preparation of herbarium specimens in consultation with the responsible teacher.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Field excursions.

Target group:

-

Prerequisites and co-requisites:

Identification of plant species (756342A), Field course in ecological botany (756343A) and Advanced identification of plant species (752608S) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

-

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Doc. Anna Liisa Ruotsalainen.

Working life cooperation:

No.

Other information:

-

755624S: Functional animal ecology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Seppo Rytönen

Opintokohteen kielet: Finnish

Leikkaavuudet:

751678S Functional animal ecology 6.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Lectures in Finnish, exercises in Finnish / English.

Timing:

B.Sc. 2 nd spring or M.Sc. 1 st spring. NNE.

Learning outcomes:

The aim of the course is to understand the relationship between morphology and function by the means of general ecomorphological model. The student will get both theoretical and practical basics for ecomorphological (and. general scientific) research procedures: scientific hypothesizing, sampling, data analysis and reporting and interpreting the results.

Contents:

The course focuses on the relationship between phenotype and function, especially the correlation between animal morphology and behaviour. The course consists of two parts: A) Lectures in Finnish. However, articles about each subject are available for foreign students, including ecomorphological models and correlations, measurement error, allometry, fluctuating asymmetry and phylogenetic analyses. B) Exercises consisting of miniature studies, field and laboratory work, and seminar. The results of the mini studies, in form of PowerPoint presentations, are presented in the seminar. Before the exercises, students write a home essay (or take an exam).

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

12 h lectures, 40 h exercises, seminar and essay (or exam).

Target group:

Recommended for ecology students.

Prerequisites and co-requisites:

Recommended Evolution, systematics and morphology of animals, practicals (750374A), Introduction to statistics 5 cr (806118P) and A second course in statistics 5 cr (806119P).

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Essay or exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Seppo Rytkönen.

Working life cooperation:

No.

Other information:

-

755608S: Bird ecology and conservation, 2 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Seppo Rytkönen, Orell, Markku Ilmari

Opintokohteen kielet: Finnish

ECTS Credits:

2 ECTS credits / 53 hours of work.

Language of instruction:

Finnish.

Timing:

M.Sc. degree. Every second year (arranged if resources allow).

Learning outcomes:

Student gets current scientific research knowledge in animal reproductive ecology and behaviour.

Contents:

Introduction to sexual reproduction and parental care in animals. Birds are used as a taxonomic reference group, but the concepts and theories are discussed in the general evolutionary ecological framework. Topics: e.g. habitat selection, territoriality, mating systems and brood parasitism.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

24 h lectures, exam.

Target group:

-

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

1-5 / Fail.

Person responsible:

Prof. Markku Orell and Doc. Seppo Rytönen.

Working life cooperation:

No.

Other information:

-

754628S: Stream ecology, 5 op**Voimassaolo:** 01.08.2015 - 31.07.2019**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Field of Biology**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Muotka, Timo Tapani**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

755336A	Population ecology	10.0 op
754320A	Stream ecology	4.0 op
754620S	Stream biology	4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 3 rd year / M.Sc. 1st or 2nd year. Arranged if resources allow.

Learning outcomes:

Basic principles of the structure and function of aquatic ecosystems.

Contents:

Interspecific competition, predation and environmental disturbance as factors regulating aquatic communities. Prey choice mechanisms of aquatic predators and avoidance behaviour of prey species. Trophic interactions in aquatic ecosystems. Biomanipulation as a management tool in water protection.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

26 h lectures, home essays.

Target group:

ECOz, optional.

Prerequisites and co-requisites:

Introduction to hydrobiology (754322A) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Handouts and Allan, J. D. & Castillo, M. M. (2007). Stream Ecology: Structure and Function of Running Waters. Springer Verlagen.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Home essays.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / hylätty.

Person responsible:

Prof. Timo Muotka.

Working life cooperation:

No.

Other information:

-

754627S: Special course in aquatic invertebrates, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Muotka, Timo Tapani

Opintokohteen kielet: Finnish

Leikkaavuudet:

751648S Special course in aquatic invertebrates 2.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1 st or 2 nd year. Every third year.

Learning outcomes:

After the course, the student will have basic knowledge on quantitative sampling of benthic invertebrates in various inland waters (mainly streams) and species level identification of benthic invertebrates.

Contents:

Field sampling and identification practices in the laboratory.

Mode of delivery:

Blended teaching.

Learning activities and teaching methods:

40 h demonstrations, lectures and exercises.

Target group:

ECOz, elective.

Prerequisites and co-requisites:

Courses Field course in aquatic animals (755321A) and Introduction to hydrobiology (754322A).

Recommended optional programme components:

-

Recommended or required reading:

Course material.

Assessment methods and criteria:

-

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Prof. Timo Muotka.

Working life cooperation:

No.

Other information:

-

754625S: Assessment and monitoring of the ecological status of water bodies, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Muotka, Timo Tapani

Opintokohteen kielet: Finnish

Leikkaavuudet:

754613S Assessment and monitoring of the ecological status of water bodies 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 3 rd or M.Sc. 1 st autumn, arranged if resources allow.

Learning outcomes:

The aim of this course is to give basic knowledge on the methods of typology, ecological status assessment, classification and biomonitoring of rivers and lakes.

Contents:

Theoretical and practical methods for setting environmental objectives and quality standards for surface waters will get acquainted.

Mode of delivery:

Blended teaching.

Learning activities and teaching methods:

20 h lectures, literature, learning assignment, final exam.

Target group:

ECOz, ECOb.

Prerequisites and co-requisites:

Field course in aquatic animals (755321A) and Basic course in hydrobiology (754322A) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Handouts, Internet material.

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Timo Muotka.

Working life cooperation:

No.

Other information:

-

755628S: Wildlife management and game animal ecology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Koivula, Jouni Aspi

Opintokohteen kielet: Finnish

Leikkaavuudet:

751668S Wildlife management and game animal ecology 6.0 op

ECTS Credits:

5 cr / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 3rd autumn or M.Sc. 1st autumn (arranged if resources allow).

Learning outcomes:

After carrying out the study module the student will be able to recognize special ecological traits of the game animals and relate them to the general ecological framework. The student will be also to appraise the basics of durable hunting of game animals. The student will be also able to appraise the basics of durable hunting of game animals and critically judge different wildlife management methods from the scientific starting point.

Contents:

The ecology of game species, their life histories, population dynamics and predator-prey relationships. Hunting ecology: man as predator, management and hunting of the game species. The impact of forestry on the game species' populations. Students are also introduced to wildlife management in practice and to the social aspect of wildlife-human relationship.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

24 h lectures, one-day excursion to a game breeding area, seminar with written reports and exam.

Target group:

-

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Seminar with report and exam.

Grading:

1-5 / Fail.

Person responsible:

Prof. Jouni Aspi ja doc. Kari Koivula.

Working life cooperation:

Yes.

Other information:

-

750626S: Environmental impact assessment (EIA) and ecological inventory of natural resources, 5 op**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Field of Biology**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Annamari Markkola, Seppo Rytönen**Opintokohteen kielet:** Finnish**ECTS Credits:**

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

M.Sc. degree, (arranged if resources allow).

Learning outcomes:

After finishing the course student get acquainted to inventory approaches of natural ecosystems and is able to apply knowledge to environmental impact assessments. Student has skills to fulfill environmental impact assessments based on different types of case studies. Additionally, student knows the legal procedure to act as responsible person for EIA.

Contents:

The course gives an overview of Environmental Impact Assessment (EIA) and its tasks according to the present legislation of the European Community. The course includes ecological impacts on e.g. hydrology, water quality, ecology, ecological inventories of nature. Course includes obligatory exercise work.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

24 h lectures, 18 h seminars.

Target group:

-

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

<http://ec.europa.eu/environment/eia/eia-support.htm>

Assessment methods and criteria:

Exam and report.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Failed.

Person responsible:

Doc. Annamari Markkola and Seppo Rytönen.

Working life cooperation:

No.

Other information:

-

750616S: Legislation in environmental protection, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Taulavuori

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 2nd or 3rd or M.Sc. 1 st autumn. Arranged if resources allow.

Learning outcomes:

To familiarise students with environmental legislation in European Union with regard to environmental protection and natural resources. Student is able to apply his knowledge to different environmental questions and analyze the needed means. Student knows the environmental administration and organisations in environmental protection and natural resources.

Contents:

Environmental protection and natural resources legislation in Finland and in Europe. Environmental administration and organisations, use and protection of natural resources, prevention of environmental destruction, assessment of environmental effect as well as principles of environmental legislation and main international conventions, environmental issues in UNEP and OECD are covered.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

24 h lectures, 18 h demonstrations and exercises.

Target group:

Compulsory to students who are doing the environmental protection 25 cr study module.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Erkki J. Hollo 2001: Ympäristönsuojelu-oikeus, WSOY, 592 s, Kokkonen, Tuomas (toim.):
Ympäristölainsäädäntö 2011. 1269 s Talentum.
The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Final exam or learning diary.
Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Kari Taulavuori.

Working life cooperation:

No.

Other information:

Also the environmental legislation course that Faculty of technology arranges is accepted.

755632S: Restoration ecology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Tolvanen, Anne Kristiina, Annamari Markkola

Opintokohteen kielet: Finnish

Leikkaavuudet:

756607S Restoration ecology 2.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. degree.

Learning outcomes:

Lectures: the student understands the ecological principles of restoration and remembers the basics of restoration options in different ecosystems. Exercises and excursion: the student is able to evaluate the need for restoration and possibilities of an ecosystem to regenerate, and apply the restoration techniques in practical restoration planning.

Contents:

Land-use impacts and ecosystem malfunctions caused by humans, ecological principles of restoration, prevention and restoration of manmade damage in the ecosystems. Examples from restoration options and practical techniques in terrestrial and aquatic ecosystems, and cultural landscapes.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

24 h lectures, exercises and an excursion.

Target group:

ECO.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Andre Clewell, James Aronson 2008: Ecological Restoration, Principles, Values, and Structure of an Emerging Profession, Island Press, 230 p. and articles in the Restoration Ecology journal.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

-

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Anne Tolvanen.

Working life cooperation:

No.

Other information:

-

750677S: Winter ecology and physiology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Taulavuori, Orell, Markku Ilmari

Opintokohteen kielet: Finnish

Leikkaavuudet:

750625S Winter ecology and physiology 3.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

English.

Timing:

B.Sc. 3 rd or M.Sc. 1 st spring. NNE.

Learning outcomes:

Student obtains basic knowledge of animal and plant acclimations and adaptations to winter, and can evaluate the effects of cold temperatures and snow on overwintering, and learns central methodology in winter ecology and physiology.

Contents:

Three independent units: 1) Winter ecology and physiology course (7 h lectures and 13 h laboratory practicals and 4 h seminar in Oulu, and 4 day long field excursion to the Oulanka Research Station (total about 50 h, 3 cr); 2) Book exam on a common exam day 2 cr: Marchand, P. J. 1996: Life in the cold. An introduction to winter ecology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures, exercises, report and seminar presentation.

Target group:

Biology students.

Prerequisites and co-requisites:

Courses Basics of ecology (750124P), Cell biology (750121P), Terrestrial animals field course (755322A), Aquatic animals field course 755321A), Field course in ecological botany (752304A) and Basics of functional plant biology, lectures (756346A) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Marchand, P. J. 1996: Life in the cold. An introduction to winter ecology. (3rd edition). University Press of New England. 304 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Seminar presentation and book exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Course + Seminar: Pass / Fail, book exam: 1-5 / Fail.

Person responsible:

Doc. Kari Taulavuori.

Working life cooperation:

No.

Other information:

-

756612S: Soil ecology, 3 - 5 op

Voimassaolo: - 31.07.2019

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Annamari Markkola

Opintokohteen kielet: Finnish

ECTS Credits:

3-5 ECTS credits / 80-133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st or 2nd year spring, (arranged if resources allow).

Learning outcomes:

Student will learn common basics of soil organisms and their interactions.

Contents:

Current soil ecological research and methods, planning and conducting experiments.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures, exercises, seminars, exam.

Target group:

-

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Additional reading Smith, S.E. & Read, D.J. 1997. Mycorrhizal symbiosis. Academic Press, San Diego and London. 605 p.; Van der Heijden, M.G.A. & Sanders, I.R. (eds) 2002. Mycorrhizal ecology. Springer, Berlin. 469 p.; Bardgett, R. D. 2005. The biology of soil: a community and ecosystem approach. Biology of Habitats series. Oxford University Press, Oxford, UK. 256 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Annamari Markkola.

Working life cooperation:

No.

Other information:

-

756604S: Plant ecophysiology in changing environments, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Taulavuori

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 3rd or M.Sc. 1st spring.

Learning outcomes:

After finishing the course student understands interactions between plant and environment, and has become acquainted to most important experimental methods in physiological plant ecology and student can apply research parameters. Student can apply the knowledge to plant production and environmental protection issues.

Contents:

The aim of the course is to initiate the students into the basics of plant ecophysiology in changing environments. The physical, chemical (abiotic) and biotic factors in the environment affects plant's growth and survival. Plant ecophysiology is an experimental science, which studies the physiological functions and adjustments underlining the ecological observations from the viewpoint of growth and survival. Different environmental stresses restrict the plant growth. Plant ecophysiology is experimental science which studies the physiological functions and regulation mechanisms on growth, survival, abundance and distribution. Effects of abiotic and biotic factors are studied. How elevated temperature, CO₂, drought stress, nutrient imbalance, air pollutants, metals, UV radiation and plant pathogens affect on plants' gas exchange, primary metabolism, carbon allocation and growth. The exercises can also focus on the effects of environmental factors on photosynthesis, respiration, transport of photosynthetic products, water economy, energy economy and nutrient economy. Special features of ecophysiology of boreal plants are also dealt with.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

20 h lectures and demonstrations, 35 h exercises, exam and report.

Target group:

ECOb, BSb, Ph.D. students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

Course is related both to plant ecology and plant physiology basic studies.

Recommended or required reading:

Hans Lambers, F. Stuart Chapin III, Thijs L. Pons 2008: Plant Physiological Ecology. Springer Verlag. 540 s. Second edition.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Seminar and report.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Dr. Kari Taulavuori.

Working life cooperation:

No.

Other information:

-

756649S: Symbiosis, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Anna-Maria Pirttilä

Opintokohteen kielet: Finnish

Leikkaavuudet:

750346A	Symbiosis	4.0 op
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750646S	Symbiosis	4.0 op
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ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. degree 3rd spring, M.Sc. 1. or 2nd spring, arranged if resources allow.

Learning outcomes:

The student knows the concept of symbiosis, understands the extent of diversity of symbiotic interactions both at the community and molecular level.

Contents:

Lately new forms of symbiosis have been discovered, extending the diversity of symbiotic interactions. Therefore the significance of symbiosis in biotechnology and for example in human health has increased. Various forms of symbiosis, their importance for the host and interaction at the molecular level are covered.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

30 h Lectures / laboratory work / demonstrations, seminar, essay, lecture diary.

Target group:

BS and ecophysiology students.

Prerequisites and co-requisites:

Studies in bioscience.

Recommended optional programme components:

-

Recommended or required reading:

Lecture notes.

Assessment methods and criteria:

Seminar, essay, lecture diary.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Anna Maria Pirttilä.

Working life cooperation:

No.

Other information:

-

A251104: Pedagogical Studies in Master's Degree, 25 - 30 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Intermediate Studies

Laji: Study module

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

Ei opintojaksokuvauksia.

Pakollinen

410070P: Sociology of education, 4 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay410070P Sociology of education: Society, educational institutions and social interaction (OPEN
UNI) 4.0 op

ECTS Credits:

4 credits

Language of instruction:

Finnish or English

Timing:

1st year

Secondary teacher students 4th year autumn term

Learning outcomes:

After completion the student will be able to visualize:

- the links between educational sociology, sociology and education.
- basic issues and concepts in social sciences and educational sociology
- the Finnish education system and educational politics as a part of social politics

Contents:

- central concepts in social sciences
- basic concepts and issues in educational sociology
- sociology of education: links to education and sociology
- the roles of socialization and education
- classic trends in the educational sociology: structuralism, conflict-theory and critical sociology, and socialization theory and interaction
- the Finnish education system: past, present and future
- education politics as a part of social politics
- theoretical and practical issues in educational sociology: school practices (interaction-based school class research), hidden curriculum, equality of education, identity, normality and deviation.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures and other teaching 18 h, independent study 89 h.

Target group:

Students in all programmes pursuing Basic Studies in Education.

Prerequisites and co-requisites:

No

Recommended optional programme components:

The course is part of the Basic Studies in Education (25 cr).

Recommended or required reading:

Aittola, T. (toim.) 2012. Kasvatussosiologian suunnannäyttäjä.

[OR Aittola, T. (toim.) (1999) Kasvatussosiologian teoreetikoita. Uudesta kasvatussosiologiasta oppimisen kriittiseen tarkasteluun.]

Antikainen, A., Rinne, R. & Koski, L. (2000) Kasvatussosiologia.

Course material availability can be checked [here](#).

Assessment methods and criteria:

Exam or written assignments.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

pass/fail

Person responsible:

Veli-Matti Ulvinen

Working life cooperation:

No

410071P: Educational philosophy, 4 op**Voimassaolo:** 01.08.2005 -**Opiskelumuoto:** Basic Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Education**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

ay410071P Educational philosophy: (OPEN UNI) 4.0 op

ECTS Credits:

4 credits

Language of instruction:

Finnish or English

Learning outcomes:

The students are familiar with the main areas of educational philosophy and how they give rise to educational problematicisation and question formulation as well as research and results. The students know how to analyse and solve ethical and philosophical problems in education and teaching and are able to critically assess previously suggested solutions.

Contents:

- Educational philosophy as an area of educational sciences
- the nature of philosophy as a science, philosophical questions and the most important sub-areas.
- Objectives in education
- Historically important trends in academic study of educational philosophy
- Ethical nature of education, training and teaching, and ethical issues in pedagogical activity

Mode of delivery:

Lectures and other face-to-face teaching 18 h, independent work 89 h

Learning activities and teaching methods:

Lectures and other teaching 18 h and independent studies.

Target group:

Students in all programmes pursuing Basic Studies in Education (25 credits).

Prerequisites and co-requisites:

No

Recommended optional programme components:

The course is part of the Basic Studies in Education (25 cr).

Recommended or required reading:

Applicable parts:

- Atjonen, P. (2004) Pedagoginen etiikka koulukasvatuksen karttana ja kompassina.
- Ojakangas, M. (2001) Pietas - Kasvatuksen mahdollisuus.
- Puolimatka, T. (1995) Kasvatus ja filosofia. (Primary reading)
- Etiikka koulun arjessa. (2002)

Course material availability can be checked [here](#).**Assessment methods and criteria:**

Exam or written assignments.

Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

pass/fail

Person responsible:

Eetu Pikkarainen

Working life cooperation:

No

050410A: Research in subject didactics, 8 op**Voimassaolo:** 01.08.2011 -**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Education**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**ECTS Credits:**

8 cr

Language of instruction:

Finnish

Timing:4th year, autumn term**Learning outcomes:**

The student knows

- how to describe the basis of pedagogical research and explain the basics of qualitative and quantitative research
- how to make use of didactic research in his/her own subject and how to compose a thesis on subject didactics
- how to choose a relevant research method for his/her study and how to analyse the research data
- how to evaluate the significance of research in subject didactics for the teaching of his/her own subject and how to construct the thinking of an inquiring teacher

Contents:

Planning, implementing and publishing a study on subject didactics. The study can be

- a teaching experiment
- a curriculum study
- a study on content knowledge in a subject
- a study of learning materials
- a study of learning environments and the instructional use of new technologies
- a study on attitudes
- a study on the leisure activities connected with a subject
- a study of assessment methods used in a subject

The study can focus on primary, secondary or tertiary education. It may also be focused on the third sector.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

- Lectures 6 h
- Methodological exercises 6 h
- Guidance 2 h
- Seminar work 36 h, including the presentation of the student's own study and acting as opponent to a peer's study
- Independent work 166 h, including the writing of a seminar thesis, preparation for opposing a peer's study, and familiarisation with other theses

Target group:

Secondary teacher students

Prerequisites and co-requisites:

Subject Didactics I, Subject Didactics II, Subject Didactics III

Recommended optional programme components:

Course is part of the Pedagogical Studies for Secondary Teachers

Recommended or required reading:

To be agreed on as the course proceeds.

Assessment methods and criteria:

Participation in contact teaching, writing and opposing a seminar thesis
Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass/fail

Person responsible:

Raimo Kaasila and lecturers in subject didactics

Working life cooperation:

No

416004A: Basics of educational administration, 2 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

1 - 2 ECTS cr

Language of instruction:

Finnish

Timing:

4.-5. year

Learning outcomes:

Upon completion of the study module, the students

- know the laws and statutes governing educational administration as well as their contents
- know how to apply educational administration legislation into practice at their own level of education
- know how to use the Finlex software

Contents:

The course aims to give the students the necessary legal proficiency for work as a public servant or in school administration. In addition, the students will gain an understanding of their own rights and obligations and learn how to recognize situations when further information and/or help is necessary. During the course, the students will be introduced with the administration system and public services in terms of set duties and opportunities as defined in legal regulations and norms.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures and exam 16 h, post-exam small group work and practice assignment 4 h.
Secondary teacher students: Lectures 10 h ja independent work max. 17 h.

Target group:

Students pursuing Pedagogical Studies

Prerequisites and co-requisites:

No

Recommended optional programme components:

Pedagogical studies for teachers

Recommended or required reading:

TBC at the beginning of the course

Assessment methods and criteria:

Exam, assignment

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

pass/fail

Person responsible:

N.N.

Working life cooperation:

No

050085A: Special education, 1 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

1 cr

Language of instruction:

Finnish

Timing:

4th year, autumn

Learning outcomes:

- The student is acquainted with the individual education plan (IEP)
- The student makes plans for a pupil's personal evaluation and teaching according to the pupil's learning abilities
- The student is familiarised with literature on special education and facing the pupil.

Contents:

- Ideologies, values and principles guiding special education
- General, special and reinforced support - care, teaching and rehabilitation
- Cooperation, multiprofessionalism and educational partnership
- Familiarisation with the field, target groups and practices of special education
- Responding to the need for special support through pedagogical means
- Pupil welfare work in schools

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 10 h, exam on Takala, M. (2010) Erityispedagogiikka ja kouluikä.

Target group:

Secondary teacher students doing their Master's studies

Prerequisites and co-requisites:

None

Recommended optional programme components:

Pedagogical Studies for Subject Teachers

Recommended or required reading:

Takala, M. (2010) Erityispedagogiikka ja kouluikä.

Assessment methods and criteria:

Participation in face-to-face teaching, visit and report, familiarisation with literature

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass/fail

Person responsible:

Marko Kielinen

Working life cooperation:

None

050082A: Advanced teaching practice I, 6 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Intermediate Studies

Laji: Practical training

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

6 cr

Language of instruction:

Finnish

Timing:

4th year autumn

Learning outcomes:

The student

- takes into account the meaning of the teacher's responsibility and is capable of assuming autonomous responsibility for his/her work as a teacher
- fully understands the meaning of cooperation between home and school
- is capable of using the knowledge and skills that s/he has learnt previously and of working independently with pupils
- knows how to apply his/her what s/he knows about assessment
- knows how to plan for and carry out assessment of studies

Contents:

The following things are done in this course:

- close specification of student's goals in teaching practice
- goal-oriented planning, implementation and evaluation of lessons
- observation and analysis of teaching
- special traits of the student's own subject (curriculum of the subject and the entire curriculum)
- information and communication technology in teaching from the viewpoint of the student's subject
- familiarisation with supervision duties
- collaboration between home and school
- individual and group guidance and autonomous study

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Contact teaching 56-66 h, independent work 94-104 h

Target group:

Secondary teacher students doing their Master's studies

Prerequisites and co-requisites:

None

Recommended optional programme components:

Pedagogical Studies for Teachers, Basic Practice

Recommended or required reading:

Depends on the subject in which student is practising

Assessment methods and criteria:

Attendance in teaching and independent work.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass/fail

Person responsible:

Sari Eskola, Hellevi Kupila and Emilia Manninen

Working life cooperation:

Yes. Teaching practice.

050083A: Advanced teaching practice II, 6 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Intermediate Studies

Laji: Practical training

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

6 cr

Language of instruction:

Finnish

Timing:

4th year autumn

Learning outcomes:

The student

- knows how to apply the knowledge that s/he has learnt and is capable of assuming autonomous and active responsibility for work as a teacher
- knows how to take into account the meaning of multiprofessional collaboration in working as a teacher
- fully understands the significance of pupil welfare in a teacher's work
- knows how to analyse and apply the knowledge and skills acquired in previous studies to work actively with pupils and students
- is capable of analysing the meaning of assessment in the work of a teacher and of applying this knowledge to the planning and implementation of study assessment

Contents:

The course involves the following things:

- autonomous, goal-oriented planning, implementation and evaluation of a large-scale teaching module either alone or in pairs
- assuming responsibility for all the aspects of a teacher's work
- deepening the picture of a teacher's work
- diversified and varied working methods: production of learning materials and using them in the lessons, mastery of basic skills in the use of interactive whiteboards, utilisation of software related to the teaching of the student's subject, the use of various learning environments and electronic learning materials in teaching

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Contact teaching 56-66 h, independent work 94-104 h

Target group:

Secondary teacher students doing their Master's studies

Prerequisites and co-requisites:

None

Recommended optional programme components:

Pedagogical Studies for Subject Teachers, Advanced Practice I

Recommended or required reading:

Depends on the subjects in which the student is practising.

Assessment methods and criteria:

Presence teaching and independent work

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass/fail

Person responsible:

Sari Eskola, Hellevi Kupila and Emilia Manninen

Working life cooperation:

Yes. Teaching practice.

300003Y: Activities in university and student organizations, 1 - 4 op

Voimassaolo: 01.01.2010 -

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Faculty of Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

Ei opintojaksokuvauksia.

300002M: Advanced Information Skills, 1 op

Voimassaolo: 01.08.2009 -

Opiskelumuoto: Other Studies

Laji: Course

Vastuuyksikkö: Faculty of Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Ursula Heinikoski

Opintokohteen kielet: Finnish

ECTS Credits:

1 ECTS credit

Language of instruction:

Finnish

Timing:

Intended for degree students working on their diploma/master's thesis. The course unit is held once in the autumn and once in the spring semester.

Learning outcomes:

Students know the different phases of scientific information retrieval process and basic techniques of systematic information search. They will find the most important reference databases of their discipline and know how to evaluate information sources and search results.

Contents:

Scientific information retrieval, evaluation of search results and information sources, information search on subject areas of diploma/master's thesis.

Mode of delivery:

Blended teaching

Learning activities and teaching methods:

Lectures 10 h, self-study 17 h

Target group:

The course is optional for students of Science and Technology.

Recommended or required reading:

Web learning material:

<http://libguides oulu.fi/tieteellinentiedonhankinta>

<http://libguides oulu.fi/julkaisujenarviointi>

Assessment methods and criteria:

Passing the course requires participation in the lectures and successful completion of the course assignments.

Grading:

pass/fail

Person responsible:

Library information specialists, informationservice(at)oulu.fi

750033Y: Tutorial for new students, 1 op

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Vanhatalo, Minna-Liisa

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

1 ECTS credit / 27 hours of work

Language of instruction:

Finnish.

Timing:

B.Sc. 3rd autumn / M.Sc. 1st autumn.

Learning outcomes:

Course develops students' skills to guide, make presentations, work in group and organize. It also advances planning, arrangement and guidance abilities as well as responsibility.

Contents:

The student guides a group of new students during the orientation course introducing them to the university, academic learning environment, the department, curriculum and other students with the help of small group meetings and presentations.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Tutorials and presentations. Minimum 15 hours. In addition independent work includes the preparation of the tutorials.

Target group:

Second and third year biology students.

Prerequisites and co-requisites:

Course 750031Y.

Recommended optional programme components:

-

Recommended or required reading:

Study guide and training material.

Assessment methods and criteria:

Tutoring report.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Ph.Lic. Minna Vanhatalo.

Working life cooperation:

No.

Other information:

-

750656S: Final examination in biology, 10 op**Voimassaolo:** 01.08.2015 -**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Field of Biology**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

751699S	Final examination in zoology	10.0 op
752699S	Final examination in botany	10.0 op
753699S	Final examination in genetics	10.0 op

ECTS Credits:

10 ECTS credits / 267 hours of work.

Language of instruction:

Depending on the book, exam answers Finnish / English.

Timing:

M.Sc. 1st or 2nd year.

Learning outcomes:

Student will understand profoundly own major's essential methods, results and theories.

Contents:

Exam books have to be agreed with the professor in beforehand.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:Book exam (4 h). Exam is held in Examinarium, instructions: <http://www oulu.fi/english/studying/examinarium>**Target group:**

TEA, ECO and BS: compulsory.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Examination on selected literature of a specific subject.

Exam books has to be agreed in beforehand with the professor.

MAJOR ECOLOGY**Animal ecology orientation (prof. Markku Orell):**

- Begon, M., Townsend, C.R. & Harper, J.L. 2006: Ecology. From Individuals to Ecosystems. - Blackwell, 658 p., (8 ECTS)
 - Ridley, M. 2004: Evolution - Blackwell, 198 p. (pp. 347-520 ja 590-613), (2 ECTS) OR
 - Futuyma, D.J. 2005: Evolution - Sinauer, 200 p. (chapters 2-6, 13, 15-16, 21), (2 ECTS).
- Or other literature agreed with the professor

Plant ecology orientation (prof. Jari Oksanen):

- Schultze, E.-D., Beck, E., K. Muller-Hohenstein. 2002. Plant ecology. Springer.
 - Crawford, R.M.M. 2008. Plants at the margin. Cambridge. (Professor needs a copy of the book in order to make the exam questions)
 - Keddy, P.A. Plants and Vegetation. Origin, processes, consequences. Cambridge.
 - Chapin, Matson & Mooney 2002. Principles of terrestrial ecosystem ecology. Springer.
- Or other literature agreed with the professor

MAJOR BIOSCIENCE**Genetics orientation (prof. Outi Savolainen):**

- Lewin Genes (XI) (or equal)

Some part of the book can be replaced with other books for example

- Nielsen, R. ja Slatkin, M. 2013 An introduction to population genetics. Sinauer, 287 p.

Or other literature agreed with the professor, for example human genetics, quantitative genetics or bioinformatics.

Animal physiology orientation (prof. Esa Hohtola):

- Compulsory book: Willmer, Stone, Johnston: Environmental Physiology of Animals, 2nd ed, Blackwell, 754 p. 8 ECTS
- Literature related to the pro gradu thesis 200-250 pages. 2 ECTS

Plant physiology orientation (prof. Hely Häggman)

- Beeckman 2009. Root Development. Annual Plant Reviews 37. - Wiley-Blackwell. ISBN 978-1-4051-6150-3
- Coruzzi Gutierrez 2009. Plant Systems Biology. Annual Plant Reviews 35. - Wiley-Blackwell. ISBN 978-1-4051-6283-8.
- Dickison, W.C. 2000. Integrative plant anatomy. 533 s. ISBN 0-12-215170-4
- Fahn, A. 1990. Plant anatomy. 4. rev. ed. 588 s. ISBN 0-08-037490
- Gan 2007. Senescence processes in plants. - Wiley-Blackwell. ISBN 978-0-8138-1963-1
- Hayat, Mori, Pichtel & Ahmad 2010. Nitric oxide in plant physiology. - Wiley-Blackwell. ISBN 978-3-527-32519-1
- Hvoslef-Eide, A.K. & Preil, W. 2005. Liquid culture systems for in vitro plant propagation. Springer ISBN 1-4020-3199-8
- Jenks & Wood 2009. Genes for Plant Abiotic Stress. - Wiley-Blackwell. ISBN 978-1-4051-3984-7
- Knight, Perroud, Cove 2009. The Moss Physcomitrella- Annual Plant Reviews, volume 36 - Wiley-Blackwell. ISBN 978-1-4051-8189-1.
- Lambers, H., Chapin III, F.S., Pons, T.L. 2008. Plant physiological ecology. Springer. 610 p. ISBN 978-0-387-78340-6
- Osbourn, A.E. & Lanzotti, V. 2009. Plant-derived natural products: synthesis, function, and application. 587 s. Springer. (Printed or electronical book version in the library)
- Parker 2008. Molecular aspects of plant disease resistance. Annual Plant Reviews, volume 34. - Wiley-Blackwell. ISBN 978-1-4051-7532-6
- Reed, B.M. 2008. Plant Cryopreservation: A Practical Guide. Springer ISBN 978-0-387-72275-7
- Smith & Read 2008. Mycorrhizal symbiosis. 3. painos. Academic Press. 800 p.
- Taiz, L. & Zeiger, E. 2010. Plant Physiology. Fifth Edition. 782 p. Sinauer Associates, Inc. ISBN-10: 0878938664
- Wink 2010. Biochemistry of plant secondary metabolism. Annual Plant Reviews, volume 40. - Wiley-Blackwell. ISBN 978-1-4051-83970. Electronical book. Link can be found for example from OULA library catalogue. Dawsonera can be accessed with koivu/paju password. <http://www.dawsonera.com/depp/reader/protected/external/AbstractView/S9781444320510>
- Yeo & Flowers 2007. Plant Solute Transport. - Wiley-Blackwell. ISBN 978-1-4051-3995-3
- Yoshioka & Shinozaki 2009. Signal Crosstalk in Plant Stress Responses - Wiley-Blackwell. ISBN 978-0-8138-1963-1

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Book exam in biology public exam day. Read more about [assessment criteria](#) at the University of Oulu webpage.

Exam in Examinarium: <http://www.oulu.fi/english/studying/examinarium>

Grading:

1-5 / Fail.

Person responsible:

M.Sc. Henriikka Honkanen, Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

750678S: Master of science seminar, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

750696S Master of science seminar 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st - 2nd year.

Learning outcomes:

The seminar gives advanced scientific communication and information retrieval skills.

Contents:

Instructions for the M.Sc. thesis and interactive reporting of the work in progress.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Student will give two seminar presentations and one research seminar and one result seminar presentation opposing, eight research seminar and eight result seminar attendances. Research plan seminar and results seminar presentations cannot be given at same day. Topics and dates have to be agreed with the professor in beforehand. See degree programme notice board for the schedule and instructions.

Target group:

Compulsory to the biology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Seminar presentations, attendance and opposing. Detailed instructions on the degree programme's notice board.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Prof. Markku Orell.

Working life cooperation:

No.

Other information:

-

750632S: Maturity exam, 0 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

0 ECTS credits / 1 hours of work.

Language of instruction:

Finnish / Swedish / English.

Timing:

M.Sc. degree.

Learning outcomes:

Student will present and analyze research material, methods and results.

Contents:

After completing the Master of Science Thesis, the student will give summary in Finnish, Swedish or English to show his/her familiarity with the topic of the thesis. If the international degree student has not done a maturity exam in her /his B.Sc. degree the student has to make a 4 pages long essay about the thesis subject in Examinarium.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Instructions at the Faculty of Science internet homepage. One teacher examine the maturity exam and Pro gradu working group accepts it.

Target group:

Compulsory to the biology students. After completing the thesis.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Summary form at the Faculty of Science internet homepage.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

750658S: Pro gradu thesis in biology, 40 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

755602S Master of science thesis in zoology 40.0 op

756602S Pro gradu thesis 40.0 op

757602S Master of science thesis in genetics 40.0 op

ECTS Credits:

40 ECTS credits / 1067 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1 st or 2 nd year.

Learning outcomes:

Student knows the research methods in specific field of biology. She is conversant with her field of thesis and is able to scientific thinking, estimating the results, analysing, drawing conclusions and scientific communicating.

Contents:

Literary work which in general includes experimental research work. Student gets profoundly acquainted on certain special field in biology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Independent research work on a scientific subject in agreement with the responsible professor and under the supervision of the Department. The supervisors may be professors of the department, docents and other teachers and researchers who have the docent's status. The student may have several supervisors, the other supervisor may be from other department, university (also abroad) or from research institute. The subject must be agreed on with the professor in advance. The research work can contain fieldwork, laboratory work, theoretical work or work on collections in museum. The work always includes a literature

survey. After having completed the thesis, the student writes the Maturity Exam. The programme director will order the final examiners by the proposal of the professor. Pro gradu working group accepts and grades the thesis on the basis of the final examiners' opinions.

Target group:

ECO and BS: compulsory 40 cr. TEA: 40 cr. optional. So called didactic pro gradu thesis cannot be 40 cr.

Prerequisites and co-requisites:

Sufficient amount of basic and subject level studies in order to be able to do independent research work.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Literary work.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

M.Sc. Henrika Honkanen, Prof. Hely Häggman, prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

Thesis is made in research groups.

Other information:

-

H750950: Subject teacher's optional advanced level studies in bioscience major, 5 - 80 op

Voimassaolo: 01.08.2016 -

Opiskelumuoto: Advanced Studies

Laji: Study module

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

Chose from

757617S: Molecular methods II, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Anna-Maria Pirttilä, Henrika Honkanen

Opintokohteen kielet: Finnish

Leikkaavuudet:

750365A Molecular methods II 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st autumn.

Learning outcomes:

The student knows how to study gene expression at different levels (transcription, translation) and understands the benefits and limitations of each method used.

Contents:

The course consists of laboratory work elaborating principles of gene expression by molecular biology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

50 h exercises including demonstrations, 50 h independent work, work reports.

Target group:

Compulsory to BS.

Prerequisites and co-requisites:

Molecular methods I (757311A).

Recommended optional programme components:

-

Recommended or required reading:

Course handout.

Assessment methods and criteria:

Demonstrations, exercises, reports.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Anna Maria Pirttilä and M.Sc. Henrika Honkanen.

Working life cooperation:

No.

Other information:

-

757613S: Basics in population genetics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Lumi Viljakainen

Opintokohteen kielet: English

Leikkaavuudet:

753614S Basics in population genetics 8.0 op

ECTS Credits:

5 cr / 133 hours of work.

Language of instruction:

English.

Timing:

B.Sc. 2nd spring BSc, M.Sc. 1st spring, ECOGEN ECOz and ECOB BS. Introduction to Population genetics compulsory to B.Sc. in M.Sc. degree.

Learning outcomes:

This course introduces genetic theories, basics of phylogenetics and usage of molecular biology methods in ecology. The aim is that students know the basic methodology, can apply them into variety of genetic

and ecological questions and is familiar with basics of population genetics and phylogenetics in order to be able to analyze and interpret genetic data.

Contents:

Basics of population genetics (variation, effective population size, bottlenecks, population structure, gene flow), relationships between molecular and adaptive variation, phylogenetic methods and phylogeography. Usage of molecular methods for identification of species, sex and individuals, behavioural ecology (mating systems, cooperation, mating success) and conservation.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

22 h lectures, 4 h seminars, 24 h exercises (problem solving, laboratory and computer exercises), take-home exam.

Target group:

Optional to BS in B.Sc. degree, compulsory to BSg and ECOGENgen in M.Sc. degree.

Prerequisites and co-requisites:

Concepts of genetics (757109P), Experimental course in general genetics (757110P) and Molecular evolution (757312A) or equivalent knowledge.

Recommended optional programme components:

Compulsory prerequisite for courses Experimental course in evolutionary genomics (757621S), Advanced course in bioinformatics (757619S) and DNA analysis in population genetics (757618S). Recommended prerequisite for course Quantitative genetics and plant and animal breeding (757616S).

Recommended or required reading:

Hamilton, M. B. 2009: Population genetics, Wiley-Blackwell.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Take-home exam, problem solving, laboratory and computer exercises, seminar.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Lumi Viljakainen.

Working life cooperation:

No.

Other information:

Note that Introduction to population genetics and Introduction to Molecular ecology courses are alternative; students cannot get credits from both.

757618S: DNA analysis in population genetics, 10 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Tanja Pyhäjärvi

Opintokohteen kielet: Finnish

Leikkaavuudet:

753631S DNA analysis in population genetics, exercises 6.0 op

753616S Specific questions in population genetic and biology 4.0 op

ECTS Credits:

10 cr / 267 hours of work.

Language of instruction:

English.

Timing:

M.Sc. 1st spring.

Learning outcomes:

Student is able to explain advanced theories in population genetics and analysing methods based on the theories.

Contents:

Coalescent theory, major sequence analysis methods and computer programmes in population genetics. Population structure research.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

24 h lectures, 3 h seminar, 6 h exercises, 24 h computer exercises, 60 h independent work, reports, exam.

Target group:

BTz compulsory.

Prerequisites and co-requisites:

Basics of population genetics (757313A) or Introduction to molecular ecology (756650S) and Basics of bioinformatics (757314A) is recommended.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Lectures, exercises, reports, seminar presentation, independent work.
Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Tanja Pyhäjärvi.

Working life cooperation:

No.

Other information:

-

752688S: Basics of tissue culture, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Häggman, Hely Margaretha, Anna-Maria Pirttilä

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 2nd or M.Sc. 1st autumn.

Learning outcomes:

The course aims to help students learn to basic plant tissue culture concepts, to establish tissue culture systems and to understand totipotency.

Contents:

Preparation of culture media and establishment of sterile cultures starting from different plant organs and tissues. Cytodifferentiation and viability tests are also included in the course. Students are able to follow how plant hormones determine the differentiation of tissues.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

8 h lectures, 35 h demonstrations and exercises, literature work, seminar.

Target group:

Optional to BS in the B.Sc. degree, compulsory to BSb in the M.Sc. degree.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

Course gives ability to further studies in molecular biology.

Recommended or required reading:

Course handout the book: Neumann K-H, Kumar A, Imani J (2009): Plant Cell and Tissue Culture – A tool in Biotechnology.

The availability of the literature can be checked from this link.

Assessment methods and criteria:

Essay, exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Hely Häggman and Doc. Anna Mari Pirttilä..

Working life cooperation:

No.

Other information:

-

750653S: Special seminar in biology, 2 - 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

755616S Seminars on special topics in zoology 2.0 op

753613S Special seminar in genetics 4.0 op

752695S Seminar on special topics in botany 2.0 op

753630S Genetics research seminar 2.0 op

754618S Research seminar in fish ecology 2.0 op

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

2-5 ECTS credits / 53-133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc., or Ph.D. degree. Arranged if resources allow.

Learning outcomes:

Students will be acquainted to current issues in biology.

Contents:

Seminars on current issues in biology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Course specific.

Target group:

Biology students.

Prerequisites and co-requisites:

Varying.

Recommended optional programme components:

-

Recommended or required reading:

Varying.

Assessment methods and criteria:

Course specific.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail or Pass / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen and docents.

Working life cooperation:

No.

Other information:

-

750654S: Special lecture in biology, 2 - 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

752667S Special topics in plant ecology 2.0 op

751690S Lectures on special topics in zoology 2.0 op

ECTS Credits:

2-5 ECTS credits / 53-133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. or Ph.D. degree. Arranged if resources allow

Learning outcomes:

Students will be acquainted to current issues in biology.

Contents:

Seminars on current issues in biology.

Mode of delivery:

Varying.

Learning activities and teaching methods:

Varying.

Target group:

Biology students.

Prerequisites and co-requisites:

Varying.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Varying.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail or Pass / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen ja dosentit.

Working life cooperation:

No.

Other information:

-

757615S: Human genetics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Savolainen Outi

Opintokohteen kielet: Finnish

Leikkaavuudet:

753607S Human genetics 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. or M.Sc. degree, autumn. Arranged if resources allow.

Learning outcomes:

To understand human evolution and man as a biological species.

Contents:

Human evolution in Africa, spread of different human species to other continents, research methods including population genetics and genomics, molecular human genetics: inherited diseases and susceptibilities.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures, home works.

Target group:

Arranged every second autumn. Course necessary for students of genetics, not compulsory. Suitable also for biochemistry students and education students.

Prerequisites and co-requisites:

Concepts of genetics (757109P) or equivalent knowledge.

Recommended optional programme components:

Educational, voluntary.

Recommended or required reading:

Jobling et al. 2014: Human evolutionary genetics. 2nd ed. Garland Science, ISBN 9780815341482. The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Learning diary, controlled exam and student activity.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

757619S: Advanced course in bioinformatics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Phillip Watts

Opintokohteen kielet: Finnish

Leikkaavuudet:

753629S Advanced course in bioinformatics 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

English.

Timing:

M.Sc. 2nd spring.

Learning outcomes:

The main objective of this course is to provide students with understanding and experience of the main techniques required to manipulate, analyse and interpret next generation sequence data. Students will understand different technologies; be capable of manipulating data files and assess data quality; assemble and map reads; identify genes and variants; complete some basic analyses of genome data.

Contents:

During the course, students will manipulate an example data set to provide a comprehensive experience of contemporary bioinformatics techniques required to identify genes and polymorphisms, as well as familiarity with the command terminal and basic LINUX commands. This course builds on Basics of bioinformatics (757314A) and complements the theory learnt in Introduction to population genetics (757313A), Introduction to molecular ecology (756650S) and Experimental course in evolutionary genomics (757621S). Lectures provide the core understanding of the main steps and principals behind data analyses, but the core content will be practical experience of handling and analysing large data sets.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Contact hours: 12 hrs lectures, 40 hrs computer exercises, 56 hr independent study. Continuous assessment (coursework) and a final exam.

Target group:

Bioscience and Ecology M.Sc.

Prerequisites and co-requisites:

Basics of bioinformatics (757314A) or equivalent knowledge, Introduction to population genetics (757313A), Molecular evolution (757312A).

Recommended optional programme components:

-

Recommended or required reading:

Good guide for much of this is the De Wit P. et al 2012: The simple fool's guide to population genomics via RNA-Seq: an introduction to high-throughput sequencing data analysis. Molecular Ecology Resources. Molecular Ecology Resources. Volume 12, Issue 6, pages 1058–1067, November 2012 and other course material.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Continuous assessment, learning diary and project report.

Grading:

1-5 / Fail.

Person responsible:

Dr. Phillip Watts.

Working life cooperation:

No.

Other information:

-

757621S: Experimental course in evolutionary genomics, 5 op

Voimassaolo: 01.08.2015 - 31.07.2020

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Phillip Watts

Opintokohteen kielet: Finnish

Leikkaavuudet:

753624S Experimental course in evolutionary genomics 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

English.

Timing:

M.Sc. 2nd spring.

Learning outcomes:

After the course the student will be able to analyze DNA sequence differences between species, applying the knowledge obtained during courses in bioinformatics and molecular evolution. The student will know how to retrieve information from public sequence databases, characterize sequences, estimate nucleotide substitutions, align sequences, build phylogenetic trees and estimate their confidence. The student will be capable of making a hypothesis related to molecular evolution and test it using sequence data.

Contents:

Sequence databases, methods and computer programs for handling and analysing sequences obtained from databases. Research appropriate scientific literature. Work is done mainly in the computer classroom.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

48 hr exercises including demonstrations and seminar, independent work including reports.

Target group:

BSg students.

Prerequisites and co-requisites:

Advanced course in bioinformatics (757619S) and Molecular evolution (757312A) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Reports, independent work and seminar.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Dr. Phillip Watts.

Working life cooperation:

No.

Other information:

-

757620S: Methods in genomics and genomics evolution, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Savolainen Outi

Opintokohteen kielet: Finnish

Leikkaavuudet:

753612S Methods in genomics and genomics evolution 6.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st autumn.

Learning outcomes:

Student knows focal features of genome structure, evolution and research methods.

Contents:

Genome structure, composition, comparative genomics, recombination and evolutionary factors affecting genome composition. Theory and methods.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

24 h lectures, 24 h seminars, independent work 83 h, exam, reports.

Target group:

BSg.

Prerequisites and co-requisites:

Concepts of genetics 5 cr (757109P), Experimental course in general genetics 5 cr (757110P) and Basics in population genetics 5 cr (757313A).

Recommended optional programme components:

-

Recommended or required reading:

Recent review articles.

Assessment methods and criteria:

Reports and exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

757616S: Quantitative genetics and plant and animal breeding, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Mikko Sillanpää

Opintokohteen kielet: Finnish

Leikkaavuudet:

753394A	Quantitative genetics and plant and animal breeding	6.0 op
753694S	Quantitative genetics and plant and animal breeding	6.0 op

Ei opintojaksokuvauksia.

756627S: Plant hormones, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Häggman, Hely Margaretha

Opintokohteen kielet: Finnish

ECTS Credits:

4 ECTS credits / 107 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1 st or 2 nd spring, (arranged if resources allow).

Learning outcomes:

The students will assess the plant hormone action, understand hormone interactions and the significance of the hormone balance as well as the molecular mechanisms.

Contents:

Plant hormones are signalling molecules with profound effects on growth and development at trace quantities. Until quite recently plant development was considered to be regulated by auxins, gibberellins, cytokinins, ethylene and abscisic acid. New analytical and molecular methods have evidenced new plant hormone receptors and signalling pathways. During the lectures the mode of action of the hormones and the latest literature is used to gain the most recent view of the topic.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

20 h and exam.

Target group:

Suitable for BSb and ecophysicologists.

Prerequisites and co-requisites:

Basics of functional plant biology lectures and exercises (752345A, 756341A).

Recommended optional programme components:

-

Recommended or required reading:

Chapters concerning plant hormones from Taiz, L. & Zeiger, E. 2010: Plant Physiology. Sinauer Associates Inc. 5. ed. and literature given in the lectures.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Hely Häggman.

Working life cooperation:

No.

Other information:

-

756615S: Physiology of forest trees, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Häggman, Hely Margaretha

Opintokohteen kielet: Finnish

ECTS Credits:

4 ECTS credits / 107 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st or 2nd spring, (arranged if resources allow).

Learning outcomes:

The student is able to assess the specific features of forest tree physiology and from this basis can judge the effect of climate change to forestry.

Contents:

Trees are long-living, often wind-pollinated, tall organisms. The juvenile phase may be long and the adult phase is characterized by both reproductive and vegetative growth which causes competition on both carbohydrates and nutrients. Cold- and drought resistance, water relations, carbon allocation and mineral nutrition will be discussed. Partly due to forest tree's economic importance biotechnological applications have been developed e.g. for the production of health promoting substances or vegetative propagation. Forest trees are interesting from the point of molecular biology- what makes a tree tree? The course will cover these topics but the emphasis may vary during the years.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures, literature, seminar, final exam.

Target group:

-

Prerequisites and co-requisites:

Lectures of Basics of plant biology (756346A) helps the following of the course.

Recommended optional programme components:

-

Recommended or required reading:

Literature agreed on lectures.

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Hely Häggman.

Working life cooperation:

No.

Other information:

-

756604S: Plant ecophysiology in changing environments, 5 op**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Field of Biology**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Kari Taulavuori**Opintokohteen kielet:** Finnish**ECTS Credits:**

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:B.Sc. 3rd or M.Sc. 1st spring.**Learning outcomes:**

After finishing the course student understands interactions between plant and environment, and has become acquainted to most important experimental methods in physiological plant ecology and student can apply research parameters. Student can apply the knowledge to plant production and environmental protection issues.

Contents:

The aim of the course is to initiate the students into the basics of plant ecophysiology in changing environments. The physical, chemical (abiotic) and biotic factors in the environment affects plant's growth and survival. Plant ecophysiology is an experimental science, which studies the physiological functions and adjustments underlining the ecological observations from the viewpoint of growth and survival. Different environmental stresses restrict the plant growth. Plant ecophysiology is experimental science which studies the physiological functions and regulation mechanisms on growth, survival, abundance and distribution. Effects of abiotic and biotic factors are studied. How elevated temperature, CO₂, drought stress, nutrient imbalance, air pollutants, metals, UV radiation and plant pathogens affect on plants' gas exchange, primary metabolism, carbon allocation and growth. The exercises can also focus on the effects of environmental factors on photosynthesis, respiration, transport of photosynthetic products, water economy, energy economy and nutrient economy. Special features of ecophysiology of boreal plants are also dealt with.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

20 h lectures and demonstrations, 35 h exercises, exam and report.

Target group:

EOb, BSb, Ph.D. students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

Course is related both to plant ecology and plant physiology basic studies.

Recommended or required reading:

Hans Lambers, F. Stuart Chapin III, Thijs L. Pons 2008: Plant Physiological Ecology. Springer Verlag. 540 s. Second edition.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Seminar and report.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Dr. Kari Taulavuori.

Working life cooperation:

No.

Other information:

-

756626S: Stress physiology of plants, 4 op

Voimassaolo: - 31.07.2020

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Häggman, Hely Margaretha, Anna-Maria Pirttilä

Opintokohteen kielet: Finnish

ECTS Credits:

4 ECTS credits / 107 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st or 2nd spring, (arranged if resources allow).

Learning outcomes:

The student will assess the effect of abiotic and biotic stresses on plant metabolism and the means of plants to cope with them.

Contents:

The course will cover all the stresses affecting plant metabolism at biochemical or molecular level. The signal transduction caused by the stresses will be followed as well as plant defense reactions. Plant pathogen biocontrol methods are introduced.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

20 h lectures, independent exercises or seminar and exam.

Target group:

Mainly for BS but also suitable for ECO.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Lecture handouts and literature given during the course.

Assessment methods and criteria:

Exam, essay/seminar.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Hely Häggman and Doc. Anna Maria Pirttilä.

Working life cooperation:

No.

Other information:

-

756649S: Symbiosis, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Anna-Maria Pirttilä

Opintokohteen kielet: Finnish

Leikkaavuudet:

750346A Symbiosis 4.0 op

750646S Symbiosis 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. degree 3rd spring, M.Sc. 1. or 2nd spring, arranged if resources allow.

Learning outcomes:

The student knows the concept of symbiosis, understands the extent of diversity of symbiotic interactions both at the community and molecular level.

Contents:

Lately new forms of symbiosis have been discovered, extending the diversity of symbiotic interactions. Therefore the significance of symbiosis in biotechnology and for example in human health has increased. Various forms of symbiosis, their importance for the host and interaction at the molecular level are covered.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

30 h Lectures / laboratory work / demonstrations, seminar, essay, lecture diary.

Target group:

BS and ecophysiology students.

Prerequisites and co-requisites:

Studies in bioscience.

Recommended optional programme components:

-

Recommended or required reading:

Lecture notes.

Assessment methods and criteria:

Seminar, essay, lecture diary.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Anna Maria Pirttilä.

Working life cooperation:

No.

Other information:

-

750677S: Winter ecology and physiology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Taulavuori, Orell, Markku Ilmari

Opintokohteen kielet: Finnish

Leikkaavuudet:

750625S Winter ecology and physiology 3.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

English.

Timing:

B.Sc. 3 rd or M.Sc. 1 st spring. NNE.

Learning outcomes:

Student obtains basic knowledge of animal and plant acclimations and adaptations to winter, and can evaluate the effects of cold temperatures and snow on overwintering, and learns central methodology in winter ecology and physiology.

Contents:

Three independent units: 1) Winter ecology and physiology course (7 h lectures and 13 h laboratory practicals and 4 h seminar in Oulu, and 4 day long field excursion to the Oulanka Research Station (total about 50 h, 3 cr); 2) Book exam on a common exam day 2 cr: Marchand, P. J. 1996: Life in the cold. An introduction to winter ecology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures, exercises, report and seminar presentation.

Target group:

Biology students.

Prerequisites and co-requisites:

Courses Basics of ecology (750124P), Cell biology (750121P), Terrestrial animals field course (755322A), Aquatic animals field course 755321A), Field course in ecological botany (752304A) and Basics of functional plant biology, lectures (756346A) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Marchand, P. J. 1996: Life in the cold. An introduction to winter ecology. (3rd edition). University Press of New England. 304 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Seminar presentation and book exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Course + Seminar: Pass / Fail, book exam: 1-5 / Fail.

Person responsible:

Doc. Kari Taulavuori.

Working life cooperation:

No.

Other information:

-

A251104: Pedagogical Studies in Master's Degree, 25 - 30 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Intermediate Studies

Laji: Study module

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

Ei opintojaksokuvauksia.

Pakollinen

410070P: Sociology of education, 4 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay410070P Sociology of education:Society, educational institutions and social interaction (OPEN
UNI) 4.0 op

ECTS Credits:

4 credits

Language of instruction:

Finnish or English

Timing:

1st year

Secondary teacher students 4th year autumn term

Learning outcomes:

After completion the student will be able to visualize:

- the links between educational sociology, sociology and education.
- basic issues and concepts in social sciences and educational sociology
- the Finnish education system and educational politics as a part of social politics

Contents:

- central concepts in social sciences
- basic concepts and issues in educational sociology
- sociology of education: links to education and sociology

- the roles of socialization and education
- classic trends in the educational sociology: structuralism, conflict-theory and critical sociology, and socialization theory and interaction
- the Finnish education system: past, present and future
- education politics as a part of social politics
- theoretical and practical issues in educational sociology: school practices (interaction-based school class research), hidden curriculum, equality of education, identity, normality and deviation.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures and other teaching 18 h, independent study 89 h.

Target group:

Students in all programmes pursuing Basic Studies in Education.

Prerequisites and co-requisites:

No

Recommended optional programme components:

The course is part of the Basic Studies in Education (25 cr).

Recommended or required reading:

Aittola, T. (toim.) 2012. Kasvatussosiologian suunnannäyttäjä.

[OR Aittola, T. (toim.) (1999) Kasvatussosiologian teoreetikoita. Uudesta kasvatussosiologiasta oppimisen kriittiseen tarkasteluun.]

Antikainen, A., Rinne, R. & Koski, L. (2000) Kasvatussosiologia.

Course material availability can be checked [here](#).

Assessment methods and criteria:

Exam or written assignments.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

pass/fail

Person responsible:

Veli-Matti Ulvinen

Working life cooperation:

No

410071P: Educational philosophy, 4 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay410071P Educational philosophy: (OPEN UNI) 4.0 op

ECTS Credits:

4 credits

Language of instruction:

Finnish or English

Learning outcomes:

The students are familiar with the main areas of educational philosophy and how they give rise to educational problematisation and question formulation as well as research and results. The students know how to analyse and solve ethical and philosophical problems in education and teaching and are able to critically assess previously suggested solutions.

Contents:

- Educational philosophy as an area of educational sciences
- the nature of philosophy as a science, philosophical questions and the most important sub-areas.
- Objectives in education
- Historically important trends in academic study of educational philosophy
- Ethical nature of education, training and teaching, and ethical issues in pedagogical activity

Mode of delivery:

Lectures and other face-to-face teaching 18 h, independent work 89 h

Learning activities and teaching methods:

Lectures and other teaching 18 h and independent studies.

Target group:

Students in all programmes pursuing Basic Studies in Education (25 credits).

Prerequisites and co-requisites:

No

Recommended optional programme components:

The course is part of the Basic Studies in Education (25 cr).

Recommended or required reading:

Applicable parts:

- Atjonen, P. (2004) Pedagoginen etiikka koulukasvatuksen karttana ja kompassina.
- Ojakangas, M. (2001) Pietas - Kasvatuksen mahdollisuus.
- Puolimatka, T. (1995) Kasvatus ja filosofia. (Primary reading)
- Etiikka koulun arjessa. (2002)

Course material availability can be checked [here](#).

Assessment methods and criteria:

Exam or written assignments.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

pass/fail

Person responsible:

Eetu Pikkarainen

Working life cooperation:

No

050410A: Research in subject didactics, 8 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

8 cr

Language of instruction:

Finnish

Timing:

4th year, autumn term

Learning outcomes:

The student knows

- how to describe the basis of pedagogical research and explain the basics of qualitative and quantitative research
- how to make use of didactic research in his/her own subject and how to compose a thesis on subject didactics
- how to choose a relevant research method for his/her study and how to analyse the research data
- how to evaluate the significance of research in subject didactics for the teaching of his/her own subject and how to construct the thinking of an inquiring teacher

Contents:

Planning, implementing and publishing a study on subject didactics. The study can be

- a teaching experiment
- a curriculum study
- a study on content knowledge in a subject
- a study of learning materials
- a study of learning environments and the instructional use of new technologies
- a study on attitudes
- a study on the leisure activities connected with a subject
- a study of assessment methods used in a subject

The study can focus on primary, secondary or tertiary education. It may also be focused on the third sector.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

- Lectures 6 h
- Methodological exercises 6 h
- Guidance 2 h
- Seminar work 36 h, including the presentation of the student's own study and acting as opponent to a peer's study
- Independent work 166 h, including the writing of a seminar thesis, preparation for opposing a peer's study, and familiarisation with other theses

Target group:

Secondary teacher students

Prerequisites and co-requisites:

Subject Didactics I, Subject Didactics II, Subject Didactics III

Recommended optional programme components:

Course is part of the Pedagogical Studies for Secondary Teachers

Recommended or required reading:

To be agreed on as the course proceeds.

Assessment methods and criteria:

Participation in contact teaching, writing and opposing a seminar thesis

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass/fail

Person responsible:

Raimo Kaasila and lecturers in subject didactics

Working life cooperation:

No

416004A: Basics of educational administration, 2 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

1 - 2 ECTS cr

Language of instruction:

Finnish

Timing:

4.-5. year

Learning outcomes:

Upon completion of the study module, the students

- know the laws and statutes governing educational administration as well as their contents
- know how to apply educational administration legislation into practice at their own level of education
- know how to use the Finlex software

Contents:

The course aims to give the students the necessary legal proficiency for work as a public servant or in school administration. In addition, the students will gain an understanding of their own rights and obligations and learn how to recognize situations when further information and/or help is necessary. During the course, the students will be introduced with the administration system and public services in terms of set duties and opportunities as defined in legal regulations and norms.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures and exam 16 h, post-exam small group work and practice assignment 4 h.

Secondary teacher students: Lectures 10 h ja independent work max. 17 h.

Target group:

Students pursuing Pedagogical Studies

Prerequisites and co-requisites:

No

Recommended optional programme components:

Pedagogical studies for teachers

Recommended or required reading:

TBC at the beginning of the course

Assessment methods and criteria:

Exam, assignment

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

pass/fail

Person responsible:

N.N.

Working life cooperation:

No

050085A: Special education, 1 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

1 cr

Language of instruction:

Finnish

Timing:

4th year, autumn

Learning outcomes:

- The student is acquainted with the individual education plan (IEP)
- The student makes plans for a pupil's personal evaluation and teaching according to the pupil's learning abilities
- The student is familiarised with literature on special education and facing the pupil.

Contents:

- Ideologies, values and principles guiding special education
- General, special and reinforced support - care, teaching and rehabilitation
- Cooperation, multiprofessionalism and educational partnership
- Familiarisation with the field, target groups and practices of special education
- Responding to the need for special support through pedagogical means
- Pupil welfare work in schools

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 10 h, exam on Takala, M. (2010) Eryityispedagogiikka ja kouluikä.

Target group:

Secondary teacher students doing their Master's studies

Prerequisites and co-requisites:

None

Recommended optional programme components:

Pedagogical Studies for Subject Teachers

Recommended or required reading:

Takala, M. (2010) Eryityispedagogiikka ja kouluikä.

Assessment methods and criteria:

Participation in face-to-face teaching, visit and report, familiarisation with literature
Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass/fail

Person responsible:

Marko Kielenen

Working life cooperation:

None

050082A: Advanced teaching practice I, 6 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Intermediate Studies

Laji: Practical training

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

6 cr

Language of instruction:

Finnish

Timing:

4th year autumn

Learning outcomes:

The student

- takes into account the meaning of the teacher's responsibility and is capable of assuming autonomous responsibility for his/her work as a teacher
- fully understands the meaning of cooperation between home and school
- is capable of using the knowledge and skills that s/he has learnt previously and of working independently with pupils
- knows how to apply his/her what s/he knows about assessment
- knows how to plan for and carry out assessment of studies

Contents:

The following things are done in this course:

- close specification of student's goals in teaching practice
- goal-oriented planning, implementation and evaluation of lessons
- observation and analysis of teaching
- special traits of the student's own subject (curriculum of the subject and the entire curriculum)
- information and communication technology in teaching from the viewpoint of the student's subject
- familiarisation with supervision duties
- collaboration between home and school
- individual and group guidance and autonomous study

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Contact teaching 56-66 h, independent work 94-104 h

Target group:

Secondary teacher students doing their Master's studies

Prerequisites and co-requisites:

None

Recommended optional programme components:

Pedagogical Studies for Teachers, Basic Practice

Recommended or required reading:

Depends on the subject in which student is practising

Assessment methods and criteria:

Attendance in teaching and independent work.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass/fail

Person responsible:

Sari Eskola, Hellevi Kupila and Emilia Manninen

Working life cooperation:

Yes. Teaching practice.

050083A: Advanced teaching practice II, 6 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Intermediate Studies

Laji: Practical training

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

6 cr

Language of instruction:

Finnish

Timing:

4th year autumn

Learning outcomes:

The student

- knows how to apply the knowledge that s/he has learnt and is capable of assuming autonomous and active responsibility for work as a teacher
- knows how to take into account the meaning of multiprofessional collaboration in working as a teacher
- fully understands the significance of pupil welfare in a teacher's work
- knows how to analyse and apply the knowledge and skills acquired in previous studies to work actively with pupils and students
- is capable of analysing the meaning of assessment in the work of a teacher and of applying this knowledge to the planning and implementation of study assessment

Contents:

The course involves the following things:

- autonomous, goal-oriented planning, implementation and evaluation of a large-scale teaching module either alone or in pairs
- assuming responsibility for all the aspects of a teacher's work
- deepening the picture of a teacher's work
- diversified and varied working methods: production of learning materials and using them in the lessons, mastery of basic skills in the use of interactive whiteboards, utilisation of software related to the teaching of the student's subject, the use of various learning environments and electronic learning materials in teaching

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Contact teaching 56-66 h, independent work 94-104 h

Target group:

Secondary teacher students doing their Master's studies

Prerequisites and co-requisites:

None

Recommended optional programme components:

Pedagogical Studies for Subject Teachers, Advanced Practice I

Recommended or required reading:

Depends on the subjects in which the student is practising.

Assessment methods and criteria:

Presence teaching and independent work

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass/fail

Person responsible:

Sari Eskola, Hellevi Kupila and Emilia Manninen

Working life cooperation:

Yes. Teaching practice.

300003Y: Activities in university and student organizations, 1 - 4 op

Voimassaolo: 01.01.2010 -

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Faculty of Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

Ei opintojaksokuvauksia.

300002M: Advanced Information Skills, 1 op

Voimassaolo: 01.08.2009 -

Opiskelumuoto: Other Studies

Laji: Course

Vastuuyksikkö: Faculty of Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Ursula Heinikoski

Opintokohteen kielet: Finnish

ECTS Credits:

1 ECTS credit

Language of instruction:

Finnish

Timing:

Intended for degree students working on their diploma/master's thesis. The course unit is held once in the autumn and once in the spring semester.

Learning outcomes:

Students know the different phases of scientific information retrieval process and basic techniques of systematic information search. They will find the most important reference databases of their discipline and know how to evaluate information sources and search results.

Contents:

Scientific information retrieval, evaluation of search results and information sources, information search on subject areas of diploma/master's thesis.

Mode of delivery:

Blended teaching

Learning activities and teaching methods:

Lectures 10 h, self-study 17 h

Target group:

The course is optional for students of Science and Technology.

Recommended or required reading:

Web learning material:

<http://libguides oulu.fi/tieteellinentiedonhankinta>

<http://libguides oulu.fi/julkaisujenarviointi>

Assessment methods and criteria:

Passing the course requires participation in the lectures and successful completion of the course assignments.

Grading:

pass/fail

Person responsible:

Library information specialists, informationservice(at)oulu.fi

750033Y: Tutorial for new students, 1 op

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Vanhatalo, Minna-Liisa

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

1 ECTS credit / 27 hours of work

Language of instruction:

Finnish.

Timing:

B.Sc. 3rd autumn / M.Sc. 1st autumn.

Learning outcomes:

Course develops students' skills to guide, make presentations, work in group and organize. It also advances planning, arrangement and guidance abilities as well as responsibility.

Contents:

The student guides a group of new students during the orientation course introducing them to the university, academic learning environment, the department, curriculum and other students with the help of small group meetings and presentations.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Tutorials and presentations. Minimum 15 hours. In addition independent work includes the preparation of the tutorials.

Target group:

Second and third year biology students.

Prerequisites and co-requisites:

Course 750031Y.

Recommended optional programme components:

-

Recommended or required reading:

Study guide and training material.

Assessment methods and criteria:

Tutoring report.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Ph.Lic. Minna Vanhatalo.

Working life cooperation:

No.

Other information:

-

750657S: Biology subject teacher pro gradu thesis, 20 - 40 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

755602S Master of science thesis in zoology 40.0 op

756602S Pro gradu thesis 40.0 op

757602S Master of science thesis in genetics 40.0 op

ECTS Credits:

20 ECTS credits / 533 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st or 2nd year.

Learning outcomes:

Student knows the research methods in specific field of biology. She is conversant with her field of thesis and is able to scientific thinking, estimating the results, analysing, drawing conclusions and scientific communicating.

Contents:

Literary work which in general includes experimental research work. Student gets profoundly acquainted on certain special field in biology teaching (didactics) or executes small research work in biology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Independent research work on a scientific subject in agreement with the responsible professor and under the supervision of the Department. The supervisors may be professors of the department, docents and other teachers and researchers who have the docent's status. The student may have several supervisors, the other supervisor may be from other department, university (also abroad) or from research institute. The subject must be agreed on with the professor in advance. The research work can contain fieldwork, laboratory work, theoretical work or work on collections in museum. The work always includes a literature survey. After having completed the thesis, the student writes the Maturity Exam. The programme director will order the final examiners by the proposal of the professor. Pro gradu working group accepts and grades the thesis on the basis of the final examiners' opinions.

Target group:

TEA: compulsory 20 cr, teacher student can also do 40 cr research pro gradu thesis in biology (750658S).

Prerequisites and co-requisites:

Sufficient amount of basic and subject level studies in order to be able to do independent research work.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Literary work.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

M.Sc. Henrika Honkanen, Prof. Hely Häggman, prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

Thesis is made in research groups.

Other information:

-

750656S: Final examination in biology, 10 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

751699S	Final examination in zoology	10.0 op
752699S	Final examination in botany	10.0 op
753699S	Final examination in genetics	10.0 op

ECTS Credits:

10 ECTS credits / 267 hours of work.

Language of instruction:

Depending on the book, exam answers Finnish / English.

Timing:

M.Sc. 1st or 2nd year.

Learning outcomes:

Student will understand profoundly own major's essential methods, results and theories.

Contents:

Exam books have to be agreed with the professor in beforehand.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Book exam (4 h). Exam is held in Examinarium, instructions: <http://www oulu.fi/english/studying/examinarium>

Target group:

TEA, ECO and BS: compulsory.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Examination on selected literature of a specific subject.

Exam books has to be agreed in beforehand with the professor.

MAJOR ECOLOGY

Animal ecology orientation (prof. Markku Orell):

- Begon, M., Townsend, C.R. & Harper, J.L. 2006: Ecology. From Individuals to Ecosystems. - Blackwell, 658 p., (8 ECTS)
 - Ridley, M. 2004: Evolution - Blackwell, 198 p. (pp. 347-520 ja 590-613), (2 ECTS) OR
 - Futuyma, D.J. 2005: Evolution - Sinauer, 200 p. (chapters 2-6, 13, 15-16, 21), (2 ECTS).
- Or other literature agreed with the proferssor

Plant ecology orientation (prof. Jari Oksanen):

- Schultze, E.-D., Beck, E., K. Muller-Hohenstein. 2002. Plant ecology. Springer.
 - Crawford, R.M.M. 2008. Plants at the margin. Cambridge. (Professor needs a copy of the book in order to make the exam questions)
 - Keddy, P.A. Plants and Vegetation. Origin, processes, consequences. Cambridge.
 - Chapin, Matson & Mooney 2002. Principles of terrestrial ecosystem ecology. Springer.
- Or other litterature agreed with the proferssor

MAJOR BIOSCIENCE

Genetics orientation (prof. Outi Savolainen):

- Lewin Genes (XI) (or equal)

Some part of the book can be replaced with other books for example

- Nielsen, R. ja Slatkin, M. 2013 An introduction to population genetics. Sinauer, 287 p.

Or other literature agreed with the proferssor, for example human genetics, quatintative genetics or bioinformatics.

Animal physiology orientation (prof. Esa Hohtola):

- Compulsory book: Willmer, Stone, Johnston: Environmental Physiology of Animals, 2nd ed, Blackwell, 754 p. 8 ECTS
- Literature related to the pro gradu thesis 200-250 pages.2 ECTS

Plant physiologi orientation (prof. Hely Häggman)

- Beeckman 2009. Root Development. Annual Plant Reviews 37. - Wiley-Blackwell. ISBN 978-1-4051-6150-3
- Coruzzi Gutierrez 2009. Plant Systems Biology. Annual Plant Reviews 35. - Wiley-Blackwell. ISBN 978-1-4051-6283-8.
- Dickison, W.C. 2000. Integrative plant anatomy. 533 s. ISBN 0-12-215170-4
- Fahn, A. 1990. Plant anatomy. 4. rev. ed. 588 s. ISBN 0-08-037490
- Gan 2007. Senescence processes in plants. - Wiley-Blackwell. ISBN 978-0-8138-1963-1
- Hayat, Mori, Pichtel & Ahmad 2010. Nitric oxide in plant physiology. - Wiley-Blackwell. ISBN 978-3-527-32519-1
- Hvoslef-Eide, A.K. & Preil, W. 2005. Liquid culture systems for in vitro plant propagation. Springer ISBN 1-4020-3199-8
- Jenks & Wood 2009. Genes for Plant Abiotic Stress. - Wiley-Blackwell. ISBN 978-1-4051-3984-7
- Knight, Perroud, Cove 2009. The Moss Physcomitrella- Annual Plant Reviews, volume 36 - Wiley-Blackwell. ISBN 978-1-4051-8189-1.
- Lambers, H., Chapin III, F.S., Pons, T.L. 2008. Plant physiological ecology. Springer. 610 p. ISBN 978-0-387-78340-6

- Osbourn, A.E. & Lanzotti, V. 2009. Plant-derived natural products: synthesis, function, and application. 587 s. Springer. (Printed or electronical book version in the library)
- Parker 2008. Molecular aspects of plant disease resistance. Annual Plant Reviews , volume 34. - Wiley-Blackwell. ISBN 978-1-4051-7532-6
- Reed, B.M. 2008. Plant Cryopreservation: A Practical Guide. Springer ISBN 978-0-387-72275-7
- Smith & Read 2008. Mycorrhizal symbiosis. 3. painos. Academic Press. 800 p.
- Taiz, L. & Zeiger, E. 2010. Plant Physiology. Fifth Edition. 782 p. Sinauer Associates, Inc. ISBN-10: 0878938664
- Wink 2010. Biochemistry of plant secondary metabolism. Annual Plant Reviews, volume 40. - Wiley-Blackwell. ISBN 978-1-4051-8397-0. Electronical book. Link can be found for example from OULA library catalogue. Dawsonera can be accessed with koivu/paju password. <http://www.dawsonera.com/depp/reader/protected/external/AbstractView/S9781444320510>
- Yeo & Flowers 2007. Plant Solute Transport. - Wiley-Blackwell. ISBN 978-1-4051-3995-3
- Yoshioka & Shinozaki 2009. Signal Crosstalk in Plant Stress Responses - Wiley-Blackwell. ISBN 978-0-8138-1963-1

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Book exam in biology public exam day. Read more about [assessment criteria](#) at the University of Oulu webpage.

Exam in Examinarium: <http://www.oulu.fi/english/studying/examinarium>

Grading:

1-5 / Fail.

Person responsible:

M.Sc. Henrika Honkanen, Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

750678S: Master of science seminar, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

750696S Master of science seminar 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st - 2nd year.

Learning outcomes:

The seminar gives advanced scientific communication and information retrieval skills.

Contents:

Instructions for the M.Sc. thesis and interactive reporting of the work in progress.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Student will give two seminar presentations and one research seminar and one result seminar presentation opposing, eight research seminar and eight result seminar attendances. Research plan seminar and results seminar presentations cannot be given at same day. Topics and dates have to be agreed with the professor in beforehand. See degree programme notice board for the schedule and instructions.

Target group:

Compulsory to the biology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-
Recommended or required reading:

-
Assessment methods and criteria:

Seminar presentations, attendance and opponentering. Detailed instructions on the degree programme's notice board. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Prof. Markku Orell.

Working life cooperation:

No.

Other information:

-

750632S: Maturity exam, 0 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

0 ECTS credits / 1 hours of work.

Language of instruction:

Finnish / Swedish / English.

Timing:

M.Sc. degree.

Learning outcomes:

Student will present and analyze research material, methods and results.

Contents:

After completing the Master of Science Thesis, the student will give summary in Finnish, Swedish or English to show his/her familiarity with the topic of the thesis. If the international degree student has not done a maturity exam in her /his B.Sc. degree the student has to make a 4 pages long essay about the thesis subject in Examinarium.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Instructions at the Faculty of Science internet homepage. One teacher examine the maturity exam and Pro gradu working group accepts it.

Target group:

Compulsory to the biology students. After completing the thesis.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Summary form at the Faculty of Science internet homepage.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

H750850: Subject teacher's optional advanced level studies in biology major, 5 - 60 op

Voimassaolo: 01.08.2016 -

Opiskelumuoto: Advanced Studies

Laji: Study module

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

Choose from

755626S: Advanced population ecology, 6 op

Voimassaolo: 01.08.2015 - 31.07.2019

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Orell, Markku Ilmari

Opintokohteen kielet: Finnish

Leikkaavuudet:

755636S Population ecology 10.0 op

755607S Population ecology 7.0 op

ECTS Credits:

6 ECTS credits / 160 hours of work.

Language of instruction:

Finnish.

Timing:

M.Sc. 1st autumn.

Learning outcomes:

Student learns central methodologies how to derive population vital parameters from various kind of long-term data to apply the information to population viability analysis. The focus is to link modeling methods to real data.

Contents:

Introduction to the mechanisms and factors, which affect the structure, size and dynamics of a population. Topics include e.g. intraspecific relationships of species, predator-prey and parasite-host interactions, competition and the structure of environment and changes in it. Information of the relations between age distribution, birth rate, mortality rate and migration of the population are needed in viability analyses of a population. The aim of the course is to initiate into the methods by which the data of individuals is leaden to the parameters describing the condition and dynamics of the population.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

30 h lectures, 30 h computer exercises, independent work, exam.

Target group:

ECO: compulsory.

Prerequisites and co-requisites:

Basics in population ecology (756351A).

Recommended optional programme components:

-

Recommended or required reading:

Supplementary reading Morris, W.F & Doak, D.F. Quantitative conservation biology. Theory and practice of population viability analysis. Akçakaya, H.R., Burgman, M.A. & Ginzburg, L.R. Applied population ecology. Principles and computer exercises using RAMAS @ EcoLab. Lande, R., Engen, S. & Sæther, B-E. Stochastic population dynamics in ecology and conservation. The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Markku Orell.

Working life cooperation:

No.

Other information:

-

755630S: Community ecology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Muotka, Timo Tapani

Opintokohteen kielet: Finnish

Leikkaavuudet:

755310A	Community ecology	3.0 op
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755610S	Community ecology	3.0 op
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ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B. Sc. 3 rd or M.Sc. 1 st spring, odd years.

Learning outcomes:

Students are introduced to essential concepts of modern community ecology. Course gives ability to understand ecological community research.

Contents:

Effects of biotic (e.g. interspecific competition, predation) and abiotic (e.g. environmental disturbances) factors on the structure of communities, temporal and spatial variation of community structure and species richness at different scales, detection of human impacts on biotic communities, macroecological phenomena.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

26 h lectures, computer demonstrations, seminar.

Target group:

ECO compulsory.

Prerequisites and co-requisites:

Basics of ecology (750124P).

Recommended optional programme components:

-

Recommended or required reading:

Handouts and book Mittelbach, G. G. Community Ecology (2012). Sinauer, 400 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Timo Muotka.

Working life cooperation:

No.

Other information:

-

751642S: Identification of vertebrates in the field, 2 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Koivula

Opintokohteen kielet: Finnish

ECTS Credits:

2 ECTS credits / 53 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st spring.

Learning outcomes:

After having the course the students have a basic knowledge (a level expected from a professional biologist) about identification of vertebrate animals in the field.

Contents:

Identification exam on birds and mammals in the field. Their natural history: tracks, droppings, nests etc.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Independent learning, exam.

Target group:

Compulsory to ECOz.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Field exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

1-5 / Fail.

Person responsible:

Doc. Kari Koivula.

Working life cooperation:

No.

Other information:

-

751666S: Animal behaviour, 5 op**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Field of Biology**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Kaitala Arja**Opintokohteen kielet:** Finnish**ECTS Credits:**

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:B.Sc. 3rd spring or M.Sc. 1st spring ECOz.**Learning outcomes:**

To understand basic principles of animal behaviour in an evolutionary ecology context.

Contents:

The basics of behavioural ecology of animals. Lecture topics: Animal foraging, predator-prey interactions, mating systems, and social behaviour. Seminars are based on the latest research results.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

30 h lectures, seminars, final exam.

Target group:

B.Sc. degree optional to ECO, M.Sc. degree compulsory to ECOz.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Davis, NB, Krebs, JR, & West, SA N.B. (2012) An Introduction to Behavioural Ecology, 4th ed, Wiley-Blackwell.

The availability of the literature can be checked from [this link](#)**Assessment methods and criteria:**

Seminar and exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Arja Kaitala.

Working life cooperation:

No.

Other information:

-

757617S: Molecular methods II, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Anna-Maria Pirttilä, Henrika Honkanen

Opintokohteen kielet: Finnish

Leikkaavuudet:

750365A Molecular methods II 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st autumn.

Learning outcomes:

The student knows how to study gene expression at different levels (transcription, translation) and understands the benefits and limitations of each method used.

Contents:

The course consists of laboratory work elaborating principles of gene expression by molecular biology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

50 h exercises including demonstrations, 50 h independent work, work reports.

Target group:

Compulsory to BS.

Prerequisites and co-requisites:

Molecular methods I (757311A).

Recommended optional programme components:

-

Recommended or required reading:

Course handout.

Assessment methods and criteria:

Demonstrations, exercises, reports.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Anna Maria Pirttilä and M.Sc. Henrika Honkanen.

Working life cooperation:

No.

Other information:

-

757613S: Basics in population genetics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Lumi Viljakainen

Opintokohteen kielet: English

Leikkaavuudet:

753614S Basics in population genetics 8.0 op

ECTS Credits:

5 cr / 133 hours of work.

Language of instruction:

English.

Timing:

B.Sc. 2nd spring BSg, M.Sc. 1st spring, ECOGEN ECOz and ECOB BS. Introduction to Population genetics compulsory to B.Sc. in M.Sc. degree.

Learning outcomes:

This course introduces genetic theories, basics of phylogenetics and usage of molecular biology methods in ecology. The aim is that students know the basic methodology, can apply them into variety of genetic and ecological questions and is familiar with basics of population genetics and phylogenetics in order to be able to analyze and interpret genetic data.

Contents:

Basics of population genetics (variation, effective population size, bottlenecks, population structure, gene flow), relationships between molecular and adaptive variation, phylogenetic methods and phylogeography. Usage of molecular methods for identification of species, sex and individuals, behavioural ecology (mating systems, cooperation, mating success) and conservation.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

22 h lectures, 4 h seminars, 24 h exercises (problem solving, laboratory and computer exercises), take-home exam.

Target group:

Optional to BS in B.Sc. degree, compulsory to BSg and ECOGENgen in M.Sc. degree.

Prerequisites and co-requisites:

Concepts of genetics (757109P), Experimental course in general genetics (757110P) and Molecular evolution (757312A) or equivalent knowledge.

Recommended optional programme components:

Compulsory prerequisite for courses Experimental course in evolutionary genomics (757621S), Advanced course in bioinformatics (757619S) and DNA analysis in population genetics (757618S). Recommended prerequisite for course Quantitative genetics and plant and animal breeding (757616S).

Recommended or required reading:

Hamilton, M. B. 2009: Population genetics, Wiley-Blackwell.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Take-home exam, problem solving, laboratory and computer exercises, seminar.
Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Lumi Viljakainen.

Working life cooperation:

No.

Other information:

Note that Introduction to population genetics and Introduction to Molecular ecology courses are alternative; students cannot get credits from both.

757618S: DNA analysis in population genetics, 10 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Tanja Pyhäjärvi

Opintokohteen kielet: Finnish

Leikkaavuudet:

753631S DNA analysis in population genetics, exercises 6.0 op

753616S Specific questions in population genetic and biology 4.0 op

ECTS Credits:

10 cr / 267 hours of work.

Language of instruction:

English.

Timing:

M.Sc. 1st spring.

Learning outcomes:

Student is able to explain advanced theories in population genetics and analysing methods based on the theories.

Contents:

Coalescent theory, major sequence analysis methods and computer programmes in population genetics. Population structure research.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

24 h lectures, 3 h seminar, 6 h exercises, 24 h computer exercises, 60 h independent work, reports, exam.

Target group:

BTz compulsory.

Prerequisites and co-requisites:

Basics of population genetics (757313A) or Introduction to molecular ecology (756650S) and Basics of bioinformatics (757314A) is recommended.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Lectures, exercises, reports, seminar presentation, independent work.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Tanja Pyhäjärvi.

Working life cooperation:

No.

Other information:

-

752688S: Basics of tissue culture, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Häggman, Hely Margaretha, Anna-Maria Pirttilä

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 2nd or M.Sc. 1st autumn.

Learning outcomes:

The course aims to help students learn to basic plant tissue culture concepts, to establish tissue culture systems and to understand totipotency.

Contents:

Preparation of culture media and establishment of sterile cultures starting from different plant organs and tissues. Cytodifferentiation and viability tests are also included in the course. Students are able to follow how plant hormones determine the differentiation of tissues.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

8 h lectures, 35 h demonstrations and exercises, literature work, seminar.

Target group:

Optional to BS in the B.Sc. degree, compulsory to BSb in the M.Sc. degree.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

Course gives ability to further studies in molecular biology.

Recommended or required reading:

Course handout the book: Neumann K-H, Kumar A, Imani J (2009): Plant Cell and Tissue Culture – A tool in Biotechnology.

The availability of the literature can be checked from this link. .

Assessment methods and criteria:

Essay, exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Hely Häggman and Doc. Anna Mari Pirttilä..

Working life cooperation:

No.

Other information:

-

750653S: Special seminar in biology, 2 - 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

755616S	Seminars on special topics in zoology	2.0 op
753613S	Special seminar in genetics	4.0 op
752695S	Seminar on special topics in botany	2.0 op
753630S	Genetics research seminar	2.0 op
754618S	Research seminar in fish ecology	2.0 op

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

2-5 ECTS credits / 53-133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc., or Ph.D. degree. Arranged if resources allow.

Learning outcomes:

Students will be acquainted to current issues in biology.

Contents:

Seminars on current issues in biology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Course specific.

Target group:

Biology students.

Prerequisites and co-requisites:

Varying.

Recommended optional programme components:

-

Recommended or required reading:

Varying.

Assessment methods and criteria:

Course specific.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail or Pass / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen and docents.

Working life cooperation:

No.

Other information:

-

750654S: Special lecture in biology, 2 - 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

752667S Special topics in plant ecology 2.0 op

751690S Lectures on special topics in zoology 2.0 op

ECTS Credits:

2-5 ECTS credits / 53-133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. or Ph.D. degree. Arranged if resources allow

Learning outcomes:

Students will be acquainted to current issues in biology.

Contents:

Seminars on current issues in biology.

Mode of delivery:

Varying.

Learning activities and teaching methods:

Varying.

Target group:

Biology students.

Prerequisites and co-requisites:

Varying.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Varying.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail or Pass / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen ja dosentit.

Working life cooperation:

No.

Other information:

-

757619S: Advanced course in bioinformatics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Phillip Watts

Opintokohteen kielet: Finnish

Leikkaavuudet:

753629S Advanced course in bioinformatics 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

English.

Timing:

M.Sc. 2nd spring.

Learning outcomes:

The main objective of this course is to provide students with understanding and experience of the main techniques required to manipulate, analyse and interpret next generation sequence data. Students will understand different technologies; be capable of manipulating data files and assess data quality; assemble and map reads; identify genes and variants; complete some basic analyses of genome data.

Contents:

During the course, students will manipulate an example data set to provide a comprehensive experience of contemporary bioinformatics techniques required to identify genes and polymorphisms, as well as familiarity with the command terminal and basic LINUX commands. This course builds on Basics of bioinformatics (757314A) and complements the theory learnt in Introduction to population genetics (757313A), Introduction to molecular ecology (756650S) and Experimental course in evolutionary genomics (757621S). Lectures provide the core understanding of the main steps and principals behind data analyses, but the core content will be practical experience of handling and analysing large data sets.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Contact hours: 12 hrs lectures, 40 hrs computer exercises, 56 hr independent study. Continuous assessment (coursework) and a final exam.

Target group:

Bioscience and Ecology M.Sc.

Prerequisites and co-requisites:

Basics of bioinformatics (757314A) or equivalent knowledge, Introduction to population genetics (757313A), Molecular evolution (757312A).

Recommended optional programme components:

-

Recommended or required reading:

Good guide for much of this is the De Wit P. et al 2012: The simple fool's guide to population genomics via RNA-Seq: an introduction to high-throughput sequencing data analysis. Molecular Ecology Resources. Molecular Ecology Resources. Volume 12, Issue 6, pages 1058–1067, November 2012 and other course material.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Continuous assessment, learning diary and project report.

Grading:

1-5 / Fail.

Person responsible:

Dr. Phillip Watts.

Working life cooperation:

No.

Other information:

-

756648S: Ecological responses to global change and air pollution in the subarctic, 5 - 8 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Taulavuori

Opintokohteen kielet: Finnish

Leikkaavuudet:

750643S Ecological responses to global change and air pollution in the subarctic 4.0 op

ECTS Credits:

5 (- 8) cr / 133 (- 240) hours of work.

Language of instruction:

Finnish / English.

Timing:

B. Sc. / M. Sc. / Ph.D., (excursion arranged if resources allow).

Learning outcomes:

Student can identify the ecological and environmental effects of climate change and air pollution in the subarctic area. In addition, the student may learn basic research methods related to topic, and how to use the facilities provided by the subarctic research stations in the research.

Contents:

Lectures deal the ecological responses of global change and air pollution. The content is focused on the environmental effects and their ecological significance in the northern areas. During excursion the student familiarizes with the special features of northern areas and explores the action and research carried out in the northern research stations.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

1) 24 h lectures with exam, and 15 h independent studies (essay and seminar work) (4 cp); **(2)** 4-5 days summer excursion and closing seminar (3 cp); participation in excursion necessitates accepted credits in the first part (lectures, independent studies).

Target group:

Ecology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-ACIA (2005) Arctic Climate Impact Assessment, Cambridge University Press, 1042 p. -AMAP Assessment 2006: Acidifying Pollutants, Arctic Haze, and Acidification in the Arctic. Arctic Monitoring and Assessment Programme (AMAP), Oslo, Norway. Xii + 112pp. Bell JNB & Trehow M (eds.) 2002. Air pollution and plant life. Wiley. 2nd edition. 480 pages.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Lectures, essay and seminar, excursion, closing report and seminar.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail

Read more about [assessment criteria](#) at the University of Oulu webpage.

Person responsible:

Doc. Kari Taulavuori.

Working life cooperation:

Possible excursion will include tours to the norther research stations.

Other information:

Field excursion is arranged if resources allow.

754626S: Field methods in freshwater biomonitoring, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Muotka, Timo Tapani

Opintokohteen kielet: Finnish

Leikkaavuudet:

754616S Field methods in freshwater biomonitoring 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

M.Sc. 1.-2. year. Arranged if resources allow.

Learning outcomes:

The course familiarises students with methods used in biomonitoring of lakes and rivers.

Contents:

Sampling methods as well as biological and ecotoxicological laboratory analysis are practiced. Survey methods used to describe the state of habitats are applied to lake and river environments.

Mode of delivery:

Blended teaching.

Learning activities and teaching methods:

10 h lectures, 30 h field and laboratory exercises, group works.

Target group:

ECOz, ECOb.

Prerequisites and co-requisites:

Field course in aquatic animals (755321A) and Basic course in hydrobiology (754322A) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Internet material, sample taking standards and instructions.

Assessment methods and criteria:

Group work.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Prof. Timo Muotka.

Working life cooperation:

No.

Other information:

-

751651S: Advanced identification in animals, 4 - 8 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

4-8 ECTS credits / 107-213 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st autumn.

Learning outcomes:

Student is able to identify special animal groups or species from museum samples and know the ecology and distribution in Finland.

Contents:

Identification of special animal groups (fishes; amphibian and reptiles; birds; mammals; some group of invertebrates), their ecology and distribution.

Student can get 5 cr from passed ornithological station bird ringing exam.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Independent study, oral final exam.

Target group:

ECOE.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Suomen eläimet 1-3; Suomen luonto: Linnut; Nisäkkäät; Kalat, Sammakkoeläimet ja matelijat, Koli, L.: Suomen kalat, Siivonen, L. & Sulkava, S.: Pohjolan nisäkkäät or relevant literature in English.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Oral exam or ornithological station bird ringing exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Markku Orell.

Working life cooperation:

No.

Other information:

-

751660S: Preparation of an insect collection, 2 - 6 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Marko Mutanen

Opintokohteen kielet: Finnish

ECTS Credits:

2-6 ECTS credits / 53-160 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. degree.

Learning outcomes:

Preparation (including labels) and identification of self-collected insects.

Contents:

Preparation of a collection on one insect order. The specimens have to be preserved adequately, identified and provided with labels. In consultation with the responsible teacher.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Independent studying.

Target group:

-

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Literature related to the topic.

Assessment methods and criteria:

Collection is delivered to the person in responsible.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Doc. Marko Mutanen.

Working life cooperation:

No.

Other information:

-

756650S: Introduction to molecular ecology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kvist, Laura Irmeli, Tanja Pyhäjärvi

Opintokohteen kielet: English

Leikkaavuudet:

750645S Molecular ecology 2.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

English.

Timing:

B.Sc. 2nd spring BSc, M.Sc. 1st spring, ECOGEN ECO and BS. Introduction to Population genetics compulsory to B.Sc. in M.Sc. degree.

Learning outcomes:

This course introduces genetic theories, basics of phylogenetics and usage of molecular biology methods in ecology. The aim is that students know the basic methodology, can apply them into variety of genetic and ecological questions and is familiar with basics of population genetics and phylogenetics in order to be able to analyze and interpret genetic data.

Contents:

Basics of population genetics (variation, effective population size, bottlenecks, population structure, gene flow), relationships between molecular and adaptive variation, phylogenetic methods and phylogeography. Usage of molecular methods for identification of species, sex and individuals, behavioural ecology (mating systems, cooperation, mating success) and conservation.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Population genetics: 20 h lectures, 4 h seminars, 24 h exercises (problem solving, laboratory and computer exercises), report, essays, home exam, final exam.

Molecular ecology: 20 h lectures, 4 h seminars, 36 h exercises (laboratory and computer exercises), final exam.

Target group:

B.Sc.: BS optional 2nd spring; M.Sc.: 1st spring BSg compulsory. ECOGEN: BS and ECO.

Prerequisites and co-requisites:

Concepts of genetics (757109P) and Experimental course in general genetics (757110P) and Molecular evolution (757312A) or equivalent knowledge.

Recommended optional programme components:

Population genetics BS: Recommended prerequisite for course Quantitative genetics and plant and animal breeding (757616S). Compulsory prerequisite for courses Experimental course in evolutionary genomics (757621S), Advanced course in bioinformatics (757619S) and DNA analysis in population genetics (757618S).

Molecular ecology ECO: Basics in population ecology (756351A) and Advanced course in population ecology (755626S).

Recommended or required reading:

Hedrick 2005: Genetics of populations 3. or 4. ed. Beebe, T and Rowe G. 2004 or 2008. An introduction to molecular ecology. Oxford University Press.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Population genetics: Home exam, final exam, seminar, essays, reports.

Molecular ecology: Final exam and seminar.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Laura Kvist and Doc. Tanja Pyhäjärvi.

Working life cooperation:

No.

Other information:

Note that Introduction to Molecular ecology and Introduction to population genetics courses are alternative; students cannot get credits from both.

752642S: Field course in arctic-alpine ecology and vegetation, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Virtanen, Risto Juhani

Opintokohteen kielet: Finnish

ECTS Credits:

4 ECTS credits / 107 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 2 nd or 3 rd autumn. M.Sc. 1 st or 2 nd autumn. Every second year at the Kilpisjärvi biological station. Arranged if resources allow.

Learning outcomes:

By passing this course a student is able to identify plant and animal species, nature types, vegetation of NW Fennoscandian mountain areas, understand ecology of northern ecosystems, ecological interactions and adaptation. Advanced training in experimental and observational field research.

Contents:

Arctic-alpine ecosystems as one the main biomes of the world. Plant and animal species of arctic-alpine areas. Vegetation and ecology of NW Fennoscandian mountain areas. Plant-herbivore interactions in tundra ecosystems.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Field course.

Target group:

Ecology students.

Prerequisites and co-requisites:

Field course in ecological botany (756343A) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Disseminated during course, internet resources. Literature on arctic-alpine ecosystems. The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Field course, field exercise. Planning of the study, field work and analyzing data. Making a report with reference to scientific literature. Oral presentation of the study (Power Point). Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Field exam including questions about the species and arctic-alpine nature. Pass / Fail.

Person responsible:

Doc. Risto Virtanen.

Working life cooperation:

No.

Other information:

Arranged with cooperation of the University of Eastern Finland.

752692S: Mire ecology, 5 op

Voimassaolo: 01.08.2003 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Virtanen, Risto Juhani

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay752692S Mire ecology 5.0 op

ECTS Credits:

4 ECTS credits / 107 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 2 nd or 3 rd autumn. M.Sc. 1 st or 2 nd autumn. Every second year at the Oulanka research station. Arranged if resources allow.

Learning outcomes:

By passing this course a student is able to identify plant species (bryophytes and vascular plants), mire types, vegetation of boreal areas, species indicator values, determine mire types, interpret ecology of mire systems and make inventories on mire landscapes.

Contents:

Plant species (bryophytes and vascular plants), mire types, vegetation of boreal areas. Regional patterns in mire vegetation, mire types and underlying ecological gradients. Mire hydrotopography and peat stratigraphy. Red list status of mire vegetation.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures 9 h, field course, demonstrations and field exercises 47 h.

Target group:

Plant ecology students.

Prerequisites and co-requisites:

Field course in ecological botany (756343A) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Eurola, S., Huttunen, A. & Kukko-oja, K. 1995: Suokasvillisuusopas. Oulanka Reports 14: 1-85 ja Eurola, S., Bendiksen, K. & Rönkä, A. 1990: Suokasviopas. Oulanka Reports 9: 1-205.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Mire type and species exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Mire types and species exam. 1-5 / Fail.

Person responsible:

Doc. Risto Virtanen.

Working life cooperation:

No.

Other information:

Organised together with the University of Eastern Finland.

752616S: Macro fungi, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

3 ECTS credits / 80 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 3rd autumn. NNE.

Learning outcomes:

Student is able to identify most common macrofungal species as fresh specimens and knows basics of fungal ecology.

Contents:

Demonstrations of macrofungi in the field, basics of identification, ecology and distribution.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

14 h lectures, 25 h exercises including excursions, identification exam.

Target group:

Optional course.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Course handout, Salo, P. and Nummela-Salo, U. 2002: Sienikurssi (752316). Toinen uusittu painos. Lajiesittelyt. Biologian laitoksen monisteita 2/2002, 41 p. and mushroom guides.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Species exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Annamari Markkola.

Working life cooperation:

No.

Other information:

-

752656S: Taxonomy and ecology of plants, 2 - 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

2-4 ECTS credits / 53-107 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st or 2nd year. Arranged if resources allow every second year. See WebOodi.

Learning outcomes:

By passing this course a student is able to identify species of the given taxonomic group, understand the ecology of the species, and know their distribution and systematic position.

Contents:

A laboratory course, field course or blended course. Species identification by means of macroscopic or microscopic characters. Making a collection of specimens, sampling and handling of the material. Preparation of herbarium specimens. Field instruction on species mapping and quantitative approach. Species' characters (morphological and chemical). Inventory methods on red listed species. Alternative themes (lichens, polypores and other fungi, and bryophytes).

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Demonstrations, identification exercises and field exercises.

Target group:

Students of plant ecology.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Material given in the course.

Assessment methods and criteria:

Species exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

doc. Anna Liisa Ruotsalainen.

Working life cooperation:

No.

Other information:

Course subject vary (lichens, polypore and other fungi, bryophytes).

752608S: Advanced identification of plant species I, 6 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Anna Ruotsalainen

Opintokohteen kielet: Finnish

ECTS Credits:

6 ECTS credits / 160 hours of work.

Language of instruction:

Finnish / English

Timing:

B.Sc. 3rd year, M.Sc. 1st year.

Learning outcomes:

Advanced identification of the vascular plants of Finland.

Contents:

Independent studying of herbarium samples. Distribution types of plants in Fennoscandia excluding the Russian parts.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Independent studying of herbarium samples. The course could be examined in two parts: 1) monocots, 2) ferns, dicots and distributions.

Target group:

-

Prerequisites and co-requisites:

Identification of plant species, extensive (756354A) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Hämet-Ahti et al. 1998: Retkeilykasvio (Field Flora of Finland), Ed. 4. Finnish Museum of Natural History, Helsinki. 656 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Species exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Anna Liisa Ruotsalainen.

Working life cooperation:

No.

Other information:

-

752625S: Advanced identification of plant species II, 5 - 8 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Anna Ruotsalainen

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

5-8 ECTS credits / 133-213 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st or 2nd year.

Learning outcomes:

Identification of systematically or ecologically limited groups. For example macrofungi, mosses, lichens, phytoplankton, aquatic, shore, forest, meadow, peatland or fell plants, species of primeval forest and macroscopic plant remains.

Contents:

Identification of systematically or ecologically limited groups from herbarium samples and preparates. Lichens 8 cr., others 5 cr.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Independent studying of herbarium samples or preparations, species exam.

Target group:

Ecology students.

Prerequisites and co-requisites:

Identification of plant species (756342A).

Recommended optional programme components:

-

Recommended or required reading:

Literature related to the topic.

Assessment methods and criteria:

Species exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Anna Liisa Ruotsalainen.

Working life cooperation:

No.

Other information:

-

752672S: Distribution mapping of plants, 2 - 5 op

Voimassaolo: - 31.07.2019

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

2-5 ECTS credits / 53-133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 3rd summer or M.Sc. 1st or 2nd summer.

Learning outcomes:

Train oneself in floristic mapping skills.

Contents:

Floristic mapping of plants with special emphasis on endangered species. Participant should agree with the Botanical Museum in advance. Field work in the provinces of Oulu and Lapland, including sample collection, identification, preparation of herbarium specimens in consultation with the responsible teacher.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Field excursions.

Target group:

-

Prerequisites and co-requisites:

Identification of plant species (756342A), Field course in ecological botany (756343A) and Advanced identification of plant species (752608S) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

-

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Doc. Anna Liisa Ruotsalainen.

Working life cooperation:

No.

Other information:

-

755624S: Functional animal ecology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Seppo Rytönen

Opintokohteen kielet: Finnish

Leikkaavuudet:

751678S Functional animal ecology 6.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Lectures in Finnish, exercises in Finnish / English.

Timing:

B.Sc. 2 nd spring or M.Sc. 1 st spring. NNE.

Learning outcomes:

The aim of the course is to understand the relationship between morphology and function by the means of general ecomorphological model. The student will get both theoretical and practical basics for ecomorphological (and. general scientific) research procedures: scientific hypothesizing, sampling, data analysis and reporting and interpreting the results.

Contents:

The course focuses on the relationship between phenotype and function, especially the correlation between animal morphology and behaviour. The course consists of two parts: A) Lectures in Finnish. However, articles about each subject are available for foreign students, including ecomorphological models and correlations, measurement error, allometry, fluctuating asymmetry and phylogenetic analyses. B)

Exercises consisting of miniature studies, field and laboratory work, and seminar. The results of the mini studies, in form of PowerPoint presentations, are presented in the seminar. Before the exercises, students write a home essay (or take an exam).

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

12 h lectures, 40 h exercises, seminar and essay (or exam).

Target group:

Recommended for ecology students.

Prerequisites and co-requisites:

Recommended Evolution, systematics and morphology of animals, practicals (750374A), Introduction to statistics 5 cr (806118P) and A second course in statistics 5 cr (806119P).

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Essay or exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Seppo Rytönen.

Working life cooperation:

No.

Other information:

-

755608S: Bird ecology and conservation, 2 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Seppo Rytönen, Orell, Markku Ilmari

Opintokohteen kielet: Finnish

ECTS Credits:

2 ECTS credits / 53 hours of work.

Language of instruction:

Finnish.

Timing:

M.Sc. degree. Every second year (arranged if resources allow).

Learning outcomes:

Student gets current scientific research knowledge in animal reproductive ecology and behaviour.

Contents:

Introduction to sexual reproduction and parental care in animals. Birds are used as a taxonomic reference group, but the concepts and theories are discussed in the general evolutionary ecological framework. Topics: e.g. habitat selection, territoriality, mating systems and brood parasitism.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

24 h lectures, exam.

Target group:

-

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Markku Orell and Doc. Seppo Rytönen.

Working life cooperation:

No.

Other information:

-

754628S: Stream ecology, 5 op

Voimassaolo: 01.08.2015 - 31.07.2019

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Muotka, Timo Tapani

Opintokohteen kielet: Finnish

Leikkaavuudet:

755336A Population ecology 10.0 op

754320A Stream ecology 4.0 op

754620S Stream biology 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 3 rd year / M.Sc. 1st or 2nd year. Arranged if resources allow.

Learning outcomes:

Basic principles of the structure and function of aquatic ecosystems.

Contents:

Interspecific competition, predation and environmental disturbance as factors regulating aquatic communities. Prey choice mechanisms of aquatic predators and avoidance behaviour of prey species. Trophic interactions in aquatic ecosystems. Biomanipulation as a management tool in water protection.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

26 h lectures, home essays.

Target group:

ECOz, optional.

Prerequisites and co-requisites:

Introduction to hydrobiology (754322A) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Handouts and Allan, J. D. & Castillo, M. M. (2007). Stream Ecology: Structure and Function of Running Waters. Springer Verlagen.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Home essays.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / hylätty.

Person responsible:

Prof. Timo Muotka.

Working life cooperation:

No.

Other information:

-

754627S: Special course in aquatic invertebrates, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Muotka, Timo Tapani

Opintokohteen kielet: Finnish

Leikkaavuudet:

751648S Special course in aquatic invertebrates 2.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1 st or 2 nd year. Every third year.

Learning outcomes:

After the course, the student will have basic knowledge on quantitative sampling of benthic invertebrates in various inland waters (mainly streams) and species level identification of benthic invertebrates.

Contents:

Field sampling and identification practices in the laboratory.

Mode of delivery:

Blended teaching.

Learning activities and teaching methods:

40 h demonstrations, lectures and exercises.

Target group:

ECOz, elective.

Prerequisites and co-requisites:

Courses Field course in aquatic animals (755321A) and Introduction to hydrobiology (754322A).

Recommended optional programme components:

-

Recommended or required reading:

Course material.

Assessment methods and criteria:

-

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Prof. Timo Muotka.

Working life cooperation:

No.

Other information:

-

754625S: Assessment and monitoring of the ecological status of water bodies, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Muotka, Timo Tapani

Opintokohteen kielet: Finnish

Leikkaavuudet:

754613S Assessment and monitoring of the ecological status of water bodies 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 3 rd or M.Sc. 1 st autumn, arranged if resources allow.

Learning outcomes:

The aim of this course is to give basic knowledge on the methods of typology, ecological status assessment, classification and biomonitoring of rivers and lakes.

Contents:

Theoretical and practical methods for setting environmental objectives and quality standards for surface waters will get acquainted.

Mode of delivery:

Blended teaching.

Learning activities and teaching methods:

20 h lectures, literature, learning assignment, final exam.

Target group:

ECOz, ECOb.

Prerequisites and co-requisites:

Field course in aquatic animals (755321A) and Basic course in hydrobiology (754322A) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Handouts, Internet material.

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Timo Muotka.

Working life cooperation:

No.

Other information:

-

755628S: Wildlife management and game animal ecology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Koivula, Jouni Aspi

Opintokohteen kielet: Finnish

Leikkaavuudet:

751668S Wildlife management and game animal ecology 6.0 op

ECTS Credits:

5 cr / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 3rd autumn or M.Sc. 1st autumn (arranged if resources allow).

Learning outcomes:

After carrying out the study module the student will be able to recognize special ecological traits of the game animals and relate them to the general ecological framework. The student will be also to appraise the basics of durable hunting of game animals. The student will be also able to appraise the basics of durable hunting of game animals and critically judge different wildlife management methods from the scientific starting point.

Contents:

The ecology of game species, their life histories, population dynamics and predator-prey relationships. Hunting ecology: man as predator, management and hunting of the game species. The impact of forestry on the game species' populations. Students are also introduced to wildlife management in practice and to the social aspect of wildlife-human relationship.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

24 h lectures, one-day excursion to a game breeding area, seminar with written reports and exam.

Target group:

-

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Seminar with report and exam.

Grading:

1-5 / Fail.

Person responsible:

Prof. Jouni Aspi ja doc. Kari Koivula.

Working life cooperation:

Yes.

Other information:

-

750626S: Environmental impact assessment (EIA) and ecological inventory of natural resources, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Annamari Markkola, Seppo Rytönen

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

M.Sc. degree, (arranged if resources allow).

Learning outcomes:

After finishing the course student get acquainted to inventory approaches of natural ecosystems and is able to apply knowledge to environmental impact assessments. Student has skills to fulfill environmental impact assessments based on different types of case studies. Additionally, student knows the legal procedure to act as responsible person for EIA.

Contents:

The course gives an overview of Environmental Impact Assessment (EIA) and its tasks according to the present legislation of the European Community. The course includes ecological impacts on e.g. hydrology, water quality, ecology, ecological inventories of nature. Course includes obligatory exercise work.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

24 h lectures, 18 h seminars.

Target group:

-

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

<http://ec.europa.eu/environment/eia/eia-support.htm>

Assessment methods and criteria:

Exam and report.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Failed.

Person responsible:

Doc. Annamari Markkola and Seppo Rytönen.

Working life cooperation:

No.

Other information:

-

750616S: Legislation in environmental protection, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Taulavuori

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 2nd or 3rd or M.Sc. 1 st autumn. Arranged if resources allow.

Learning outcomes:

To familiarise students with environmental legislation in European Union with regard to environmental protection and natural resources. Student is able to apply his knowledge to different environmental questions and analyze the needed means. Student knows the environmental administration and organisations in environmental protection and natural resources.

Contents:

Environmental protection and natural resources legislation in Finland and in Europe. Environmental administration and organisations, use and protection of natural resources, prevention of environmental destruction, assessment of environmental effect as well as principles of environmental legislation and main international conventions, environmental issues in UNEP and OECD are covered.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

24 h lectures, 18 h demonstrations and exercises.

Target group:

Compulsory to students who are doing the environmental protection 25 cr study module.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Erkki J. Hollo 2001: Ympäristönsuojeluoikeus, WSOY, 592 s, Kokkonen, Tuomas (toim.): Ympäristölainsäädäntö 2011. 1269 s Talentum.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Final exam or learning diary.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Kari Taulavuori.

Working life cooperation:

No.

Other information:

Also the environmental legislation course that Faculty of technology arranges is accepted.

755632S: Restoration ecology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Tolvanen, Anne Kristiina, Annamari Markkola

Opintokohteen kielet: Finnish

Leikkaavuudet:

756607S Restoration ecology 2.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. degree.

Learning outcomes:

Lectures: the student understands the ecological principles of restoration and remembers the basics of restoration options in different ecosystems. Exercises and excursion: the student is able to evaluate the need for restoration and possibilities of an ecosystem to regenerate, and apply the restoration techniques in practical restoration planning.

Contents:

Land-use impacts and ecosystem malfunctions caused by humans, ecological principles of restoration, prevention and restoration of manmade damage in the ecosystems. Examples from restoration options and practical techniques in terrestrial and aquatic ecosystems, and cultural landscapes.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

24 h lectures, exercises and an excursion.

Target group:

ECO.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Andre Clewell, James Aronson 2008: Ecological Restoration, Principles, Values, and Structure of an Emerging Profession, Island Press, 230 p. and articles in the Restoration Ecology journal.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

-

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Anne Tolvanen.

Working life cooperation:

No.

Other information:

-

750677S: Winter ecology and physiology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Taulavuori, Orell, Markku Ilmari

Opintokohteen kielet: Finnish

Leikkaavuudet:

750625S Winter ecology and physiology 3.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

English.

Timing:

B.Sc. 3 rd or M.Sc. 1 st spring. NNE.

Learning outcomes:

Student obtains basic knowledge of animal and plant acclimations and adaptations to winter, and can evaluate the effects of cold temperatures and snow on overwintering, and learns central methodology in winter ecology and physiology.

Contents:

Three independent units: 1) Winter ecology and physiology course (7 h lectures and 13 h laboratory practicals and 4 h seminar in Oulu, and 4 day long field excursion to the Oulanka Research Station (total about 50 h, 3 cr); 2) Book exam on a common exam day 2 cr: Marchand, P. J. 1996: Life in the cold. An introduction to winter ecology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures, exercises, report and seminar presentation.

Target group:

Biology students.

Prerequisites and co-requisites:

Courses Basics of ecology (750124P), Cell biology (750121P), Terrestrial animals field course (755322A), Aquatic animals field course 755321A), Field course in ecological botany (752304A) and Basics of functional plant biology, lectures (756346A) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Marchand, P. J. 1996: Life in the cold. An introduction to winter ecology. (3rd edition). University Press of New England. 304 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Seminar presentation and book exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Course + Seminar: Pass / Fail, book exam: 1-5 / Fail.

Person responsible:

Doc. Kari Taulavuori.

Working life cooperation:

No.

Other information:

-

756612S: Soil ecology, 3 - 5 op

Voimassaolo: - 31.07.2019

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Annamari Markkola

Opintokohteen kielet: Finnish

ECTS Credits:

3-5 ECTS credits / 80-133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st or 2nd year spring, (arranged if resources allow).

Learning outcomes:

Student will learn common basics of soil organisms and their interactions.

Contents:

Current soil ecological research and methods, planning and conducting experiments.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures, exercises, seminars, exam.

Target group:

-

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Additional reading Smith, S.E. & Read, D.J. 1997. Mycorrhizal symbiosis. Academic Press, San Diego and London. 605 p.; Van der Heijden, M.G.A. & Sanders, I.R. (eds) 2002. Mycorrhizal ecology. Springer, Berlin. 469 p.; Bardgett, R. D. 2005. The biology of soil: a community and ecosystem approach. Biology of Habitats series. Oxford University Press, Oxford, UK. 256 p.
The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Annamari Markkola.

Working life cooperation:

No.

Other information:

-

756604S: Plant ecophysiology in changing environments, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Taulavuori

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 3rd or M.Sc. 1st spring.

Learning outcomes:

After finishing the course student understands interactions between plant and environment, and has become acquainted to most important experimental methods in physiological plant ecology and student can apply research parameters. Student can apply the knowledge to plant production and environmental protection issues.

Contents:

The aim of the course is to initiate the students into the basics of plant ecophysiology in changing environments. The physical, chemical (abiotic) and biotic factors in the environment affects plant's growth and survival. Plant ecophysiology is an experimental science, which studies the physiological functions and adjustments underlining the ecological observations from the viewpoint of growth and survival. Different environmental stresses restrict the plant growth. Plant ecophysiology is experimental science which studies the physiological functions and regulation mechanisms on growth, survival, abundance and distribution. Effects of abiotic and biotic factors are studied. How elevated temperature, CO₂, drought stress, nutrient imbalance, air pollutants, metals, UV radiation and plant pathogens affect on plants' gas exchange, primary metabolism, carbon allocation and growth. The exercises can also focus on the effects of environmental factors on photosynthesis, respiration, transport of photosynthetic products, water economy, energy economy and nutrient economy. Special features of ecophysiology of boreal plants are also dealt with.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

20 h lectures and demonstrations, 35 h exercises, exam and report.

Target group:

ECOb, BSb, Ph.D. students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

Course is related both to plant ecology and plant physiology basic studies.

Recommended or required reading:

Hans Lambers, F. Stuart Chapin III, Thijs L. Pons 2008: Plant Physiological Ecology. Springer Verlag. 540 s. Second edition.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Seminar and report.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Dr. Kari Taulavuori.

Working life cooperation:

No.

Other information:

-

756649S: Symbiosis, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Anna-Maria Pirttilä

Opintokohteen kielet: Finnish

Leikkaavuudet:

750346A Symbiosis 4.0 op

750646S Symbiosis 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. degree 3rd spring, M.Sc. 1. or 2nd spring, arranged if resources allow.

Learning outcomes:

The student knows the concept of symbiosis, understands the extent of diversity of symbiotic interactions both at the community and molecular level.

Contents:

Lately new forms of symbiosis have been discovered, extending the diversity of symbiotic interactions. Therefore the significance of symbiosis in biotechnology and for example in human health has increased. Various forms of symbiosis, their importance for the host and interaction at the molecular level are covered.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

30 h Lectures / laboratory work / demonstrations, seminar, essay, lecture diary.

Target group:

BS and ecophysiology students.

Prerequisites and co-requisites:

Studies in bioscience.

Recommended optional programme components:

-

Recommended or required reading:

Lecture notes.

Assessment methods and criteria:

Seminar, essay, lecture diary.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Anna Maria Pirttilä.

Working life cooperation:

No.

Other information:

-

757615S: Human genetics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Savolainen Outi

Opintokohteen kielet: Finnish

Leikkaavuudet:

753607S Human genetics 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. or M.Sc. degree, autumn. Arranged if resources allow.

Learning outcomes:

To understand human evolution and man as a biological species.

Contents:

Human evolution in Africa, spread of different human species to other continents, research methods including population genetics and genomics, molecular human genetics: inherited diseases and susceptibilities.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures, home works.

Target group:

Arranged every second autumn. Course necessary for students of genetics, not compulsory. Suitable also for biochemistry students and education students.

Prerequisites and co-requisites:

Concepts of genetics (757109P) or equivalent knowledge.

Recommended optional programme components:

Educational, voluntary.

Recommended or required reading:

Jobling et al. 2014: Human evolutionary genetics. 2nd ed. Garland Science, ISBN 9780815341482. The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Learning diary, controlled exam and student activity.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

757621S: Experimental course in evolutionary genomics, 5 op

Voimassaolo: 01.08.2015 - 31.07.2020

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Phillip Watts

Opintokohteen kielet: Finnish

Leikkaavuudet:

753624S Experimental course in evolutionary genomics 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

English.

Timing:

M.Sc. 2nd spring.

Learning outcomes:

After the course the student will be able to analyze DNA sequence differences between species, applying the knowledge obtained during courses in bioinformatics and molecular evolution. The student will know how to retrieve information from public sequence databases, characterize sequences, estimate nucleotide substitutions, align sequences, build phylogenetic trees and estimate their confidence. The student will be capable of making a hypothesis related to molecular evolution and test it using sequence data.

Contents:

Sequence databases, methods and computer programs for handling and analysing sequences obtained from databases. Research appropriate scientific literature. Work is done mainly in the computer classroom.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

48 hr exercises including demonstrations and seminar, independent work including reports.

Target group:

BSg students.

Prerequisites and co-requisites:

Advanced course in bioinformatics (757619S) and Molecular evolution (757312A) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Reports, independent work and seminar.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Dr. Phillip Watts.

Working life cooperation:

No.

Other information:

-

757620S: Methods in genomics and genomics evolution, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Savolainen Outi

Opintokohteen kielet: Finnish

Leikkaavuudet:

753612S Methods in genomics and genomics evolution 6.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st autumn.

Learning outcomes:

Student knows focal features of genome structure, evolution and research methods.

Contents:

Genome structure, composition, comparative genomics, recombination and evolutionary factors affecting genome composition. Theory and methods.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

24 h lectures, 24 h seminars, independent work 83 h, exam, reports.

Target group:

BSg.

Prerequisites and co-requisites:

Concepts of genetics 5 cr (757109P), Experimental course in general genetics 5 cr (757110P) and Basics in population genetics 5 cr (757313A).

Recommended optional programme components:

-

Recommended or required reading:

Recent review articles.

Assessment methods and criteria:

Reports and exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

757616S: Quantitative genetics and plant and animal breeding, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Mikko Sillanpää

Opintokohteen kielet: Finnish

Leikkaavuudet:

753394A	Quantitative genetics and plant and animal breeding	6.0 op
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753694S	Quantitative genetics and plant and animal breeding	6.0 op
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Ei opintojaksokuvauksia.

756627S: Plant hormones, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Häggman, Hely Margaretha

Opintokohteen kielet: Finnish

ECTS Credits:

4 ECTS credits / 107 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1 st or 2 nd spring, (arranged if resources allow).

Learning outcomes:

The students will assess the plant hormone action, understand hormone interactions and the significance of the hormone balance as well as the molecular mechanisms.

Contents:

Plant hormones are signalling molecules with profound effects on growth and development at trace quantities. Until quite recently plant development was considered to be regulated by auxins, gibberellins, cytokinins, ethylene and abscisic acid. New analytical and molecular methods have evidenced new plant hormone receptors and signalling pathways. During the lectures the mode of action of the hormones and the latest literature is used to gain the most recent view of the topic.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

20 h and exam.

Target group:

Suitable for BSb and ecophysiologists.

Prerequisites and co-requisites:

Basics of functional plant biology lectures and exercises (752345A, 756341A).

Recommended optional programme components:

-

Recommended or required reading:

Chapters concerning plant hormones from Taiz, L. & Zeiger, E. 2010: Plant Physiology. Sinauer Associates Inc. 5. ed. and literature given in the lectures.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Hely Häggman.

Working life cooperation:

No.

Other information:

-

756615S: Physiology of forest trees, 5 op**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Field of Biology**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Häggman, Hely Margaretha**Opintokohteen kielet:** Finnish**ECTS Credits:**

4 ECTS credits / 107 hours of work.

Language of instruction:

Finnish / English.

Timing:M.Sc. 1st or 2nd spring, (arranged if resources allow).**Learning outcomes:**

The student is able to assess the specific features of forest tree physiology and from this basis can judge the effect of climate change to forestry.

Contents:

Trees are long-living, often wind-pollinated, tall organisms. The juvenile phase may be long and the adult phase is characterized by both reproductive and vegetative growth which causes competition on both carbohydrates and nutrients. Cold- and drought resistance, water relations, carbon allocation and mineral nutrition will be discussed. Partly due to forest tree's economic importance biotechnological applications have been developed e.g. for the production of health promoting substances or vegetative propagation. Forest trees are interesting from the point of molecular biology- what makes a tree tree? The course will cover these topics but the emphasis may vary during the years.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures, literature, seminar, final exam.

Target group:

-

Prerequisites and co-requisites:

Lectures of Basics of plant biology (756346A) helps the following of the course.

Recommended optional programme components:

-

Recommended or required reading:

Literature agreed on lectures.

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

1-5 / Fail.

Person responsible:

Prof. Hely Häggman.

Working life cooperation:

No.

Other information:

-

756626S: Stress physiology of plants, 4 op

Voimassaolo: - 31.07.2020

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Häggman, Hely Margaretha, Anna-Maria Pirttilä

Opintokohteen kielet: Finnish

ECTS Credits:

4 ECTS credits / 107 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st or 2nd spring, (arranged if resources allow).

Learning outcomes:

The student will assess the effect of abiotic and biotic stresses on plant metabolism and the means of plants to cope with them.

Contents:

The course will cover all the stresses affecting plant metabolism at biochemical or molecular level. The signal transduction caused by the stresses will be followed as well as plant defense reactions. Plant pathogen biocontrol methods are introduced.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

20 h lectures, independent exercises or seminar and exam.

Target group:

Mainly for BS but also suitable for ECO.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Lecture handouts and literature given during the course.

Assessment methods and criteria:

Exam, essay/seminar.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Hely Häggman and Doc. Anna Maria Pirttilä.

Working life cooperation:

No.

Other information:

-

A251104: Pedagogical Studies in Master's Degree, 25 - 30 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Intermediate Studies

Laji: Study module

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

Ei opintojaksokuvauksia.

Pakollinen

410070P: Sociology of education, 4 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay410070P Sociology of education: Society, educational institutions and social interaction (OPEN
UNI) 4.0 op

ECTS Credits:

4 credits

Language of instruction:

Finnish or English

Timing:

1st year

Secondary teacher students 4th year autumn term

Learning outcomes:

After completion the student will be able to visualize:

- the links between educational sociology, sociology and education.
- basic issues and concepts in social sciences and educational sociology
- the Finnish education system and educational politics as a part of social politics

Contents:

- central concepts in social sciences
- basic concepts and issues in educational sociology
- sociology of education: links to education and sociology
- the roles of socialization and education
- classic trends in the educational sociology: structuralism, conflict-theory and critical sociology, and socialization theory and interaction
- the Finnish education system: past, present and future
- education politics as a part of social politics
- theoretical and practical issues in educational sociology: school practices (interaction-based school class research), hidden curriculum, equality of education, identity, normality and deviation.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures and other teaching 18 h, independent study 89 h.

Target group:

Students in all programmes pursuing Basic Studies in Education.

Prerequisites and co-requisites:

No

Recommended optional programme components:

The course is part of the Basic Studies in Education (25 cr).

Recommended or required reading:

Aittola, T. (toim.) 2012. Kasvatussosiologian suunnannäyttäjiä.
 [OR Aittola, T. (toim.) (1999) Kasvatussosiologian teoreetikoita. Uudesta kasvatussosiologiasta oppimisen kriittiseen tarkasteluun.]
 Antikainen, A., Rinne, R. & Koski, L. (2000) Kasvatussosiologia.
 Course material availability can be checked [here](#).

Assessment methods and criteria:

Exam or written assignments.
 Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

pass/fail

Person responsible:

Veli-Matti Ulvinen

Working life cooperation:

No

410071P: Educational philosophy, 4 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay410071P Educational philosophy: (OPEN UNI) 4.0 op

ECTS Credits:

4 credits

Language of instruction:

Finnish or English

Learning outcomes:

The students are familiar with the main areas of educational philosophy and how they give rise to educational problematisation and question formulation as well as research and results. The students know how to analyse and solve ethical and philosophical problems in education and teaching and are able to critically assess previously suggested solutions.

Contents:

- Educational philosophy as an area of educational sciences
- the nature of philosophy as a science, philosophical questions and the most important sub-areas.
- Objectives in education
- Historically important trends in academic study of educational philosophy
- Ethical nature of education, training and teaching, and ethical issues in pedagogical activity

Mode of delivery:

Lectures and other face-to-face teaching 18 h, independent work 89 h

Learning activities and teaching methods:

Lectures and other teaching 18 h and independent studies.

Target group:

Students in all programmes pursuing Basic Studies in Education (25 credits).

Prerequisites and co-requisites:

No

Recommended optional programme components:

The course is part of the Basic Studies in Education (25 cr).

Recommended or required reading:

Applicable parts:

- Atjonen, P. (2004) Pedagoginen etiikka koulukasvatuksen karttana ja kompassina.
- Ojakangas, M. (2001) Pietas - Kasvatuksen mahdollisuus.
- Puolimatka, T. (1995) Kasvatus ja filosofia. (Primary reading)
- Etiikka koulun arjessa. (2002)

Course material availability can be checked [here](#).

Assessment methods and criteria:

Exam or written assignments.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

pass/fail

Person responsible:

Eetu Pikkarainen

Working life cooperation:

No

050410A: Research in subject didactics, 8 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

8 cr

Language of instruction:

Finnish

Timing:

4th year, autumn term

Learning outcomes:

The student knows

- how to describe the basis of pedagogical research and explain the basics of qualitative and quantitative research
- how to make use of didactic research in his/her own subject and how to compose a thesis on subject didactics
- how to choose a relevant research method for his/her study and how to analyse the research data
- how to evaluate the significance of research in subject didactics for the teaching of his/her own subject and how to construct the thinking of an inquiring teacher

Contents:

Planning, implementing and publishing a study on subject didactics. The study can be

- a teaching experiment
- a curriculum study
- a study on content knowledge in a subject
- a study of learning materials
- a study of learning environments and the instructional use of new technologies
- a study on attitudes
- a study on the leisure activities connected with a subject
- a study of assessment methods used in a subject

The study can focus on primary, secondary or tertiary education. It may also be focused on the third sector.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

- Lectures 6 h
- Methodological exercises 6 h
- Guidance 2 h
- Seminar work 36 h, including the presentation of the student's own study and acting as opponent to a peer's study
- Independent work 166 h, including the writing of a seminar thesis, preparation for opposing a peer's study, and familiarisation with other theses

Target group:

Secondary teacher students

Prerequisites and co-requisites:

Subject Didactics I, Subject Didactics II, Subject Didactics III

Recommended optional programme components:

Course is part of the Pedagogical Studies for Secondary Teachers

Recommended or required reading:

To be agreed on as the course proceeds.

Assessment methods and criteria:

Participation in contact teaching, writing and opposing a seminar thesis
Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass/fail

Person responsible:

Raimo Kaasila and lecturers in subject didactics

Working life cooperation:

No

416004A: Basics of educational administration, 2 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

1 - 2 ECTS cr

Language of instruction:

Finnish

Timing:

4.-5. year

Learning outcomes:

Upon completion of the study module, the students

- know the laws and statutes governing educational administration as well as their contents
- know how to apply educational administration legislation into practice at their own level of education
- know how to use the Finlex software

Contents:

The course aims to give the students the necessary legal proficiency for work as a public servant or in school administration. In addition, the students will gain an understanding of their own rights and

obligations and learn how to recognize situations when further information and/or help is necessary. During the course, the students will be introduced with the administration system and public services in terms of set duties and opportunities as defined in legal regulations and norms.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures and exam 16 h, post-exam small group work and practice assignment 4 h.
Secondary teacher students: Lectures 10 h ja independent work max. 17 h.

Target group:

Students pursuing Pedagogical Studies

Prerequisites and co-requisites:

No

Recommended optional programme components:

Pedagogical studies for teachers

Recommended or required reading:

TBC at the beginning of the course

Assessment methods and criteria:

Exam, assignment

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

pass/fail

Person responsible:

N.N.

Working life cooperation:

No

050085A: Special education, 1 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

1 cr

Language of instruction:

Finnish

Timing:

4th year, autumn

Learning outcomes:

- The student is acquainted with the individual education plan (IEP)
- The student makes plans for a pupil's personal evaluation and teaching according to the pupil's learning abilities
- The student is familiarised with literature on special education and facing the pupil.

Contents:

- Ideologies, values and principles guiding special education
- General, special and reinforced support - care, teaching and rehabilitation
- Cooperation, multiprofessionalism and educational partnership
- Familiarisation with the field, target groups and practices of special education
- Responding to the need for special support through pedagogical means

- Pupil welfare work in schools

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 10 h, exam on Takala, M. (2010) Erytispedagogiikka ja kouluikä.

Target group:

Secondary teacher students doing their Master's studies

Prerequisites and co-requisites:

None

Recommended optional programme components:

Pedagogical Studies for Subject Teachers

Recommended or required reading:

Takala, M. (2010) Erytispedagogiikka ja kouluikä.

Assessment methods and criteria:

Participation in face-to-face teaching, visit and report, familiarisation with literature

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass/fail

Person responsible:

Marko Kielinen

Working life cooperation:

None

050082A: Advanced teaching practice I, 6 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Intermediate Studies

Laji: Practical training

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

6 cr

Language of instruction:

Finnish

Timing:

4th year autumn

Learning outcomes:

The student

- takes into account the meaning of the teacher's responsibility and is capable of assuming autonomous responsibility for his/her work as a teacher
- fully understands the meaning of cooperation between home and school
- is capable of using the knowledge and skills that s/he has learnt previously and of working independently with pupils
- knows how to apply his/her what s/he knows about assessment
- knows how to plan for and carry out assessment of studies

Contents:

The following things are done in this course:

- close specification of student's goals in teaching practice
- goal-oriented planning, implementation and evaluation of lessons
- observation and analysis of teaching

- special traits of the student's own subject (curriculum of the subject and the entire curriculum)
- information and communication technology in teaching from the viewpoint of the student's subject
- familiarisation with supervision duties
- collaboration between home and school
- individual and group guidance and autonomous study

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Contact teaching 56-66 h, independent work 94-104 h

Target group:

Secondary teacher students doing their Master's studies

Prerequisites and co-requisites:

None

Recommended optional programme components:

Pedagogical Studies for Teachers, Basic Practice

Recommended or required reading:

Depends on the subject in which student is practising

Assessment methods and criteria:

Attendance in teaching and independent work.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass/fail

Person responsible:

Sari Eskola, Hellevi Kupila and Emilia Manninen

Working life cooperation:

Yes. Teaching practice.

050083A: Advanced teaching practice II, 6 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Intermediate Studies

Laji: Practical training

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

6 cr

Language of instruction:

Finnish

Timing:

4th year autumn

Learning outcomes:

The student

- knows how to apply the knowledge that s/he has learnt and is capable of assuming autonomous and active responsibility for work as a teacher
- knows how to take into account the meaning of multiprofessional collaboration in working as a teacher
- fully understands the significance of pupil welfare in a teacher's work
- knows how to analyse and apply the knowledge and skills acquired in previous studies to work actively with pupils and students

- is capable of analysing the meaning of assessment in the work of a teacher and of applying this knowledge to the planning and implementation of study assessment

Contents:

The course involves the following things:

- autonomous, goal-oriented planning, implementation and evaluation of a large-scale teaching module either alone or in pairs
- assuming responsibility for all the aspects of a teacher's work
- deepening the picture of a teacher's work
- diversified and varied working methods: production of learning materials and using them in the lessons, mastery of basic skills in the use of interactive whiteboards, utilisation of software related to the teaching of the student's subject, the use of various learning environments and electronic learning materials in teaching

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Contact teaching 56-66 h, independent work 94-104 h

Target group:

Secondary teacher students doing their Master's studies

Prerequisites and co-requisites:

None

Recommended optional programme components:

Pedagogical Studies for Subject Teachers, Advanced Practice I

Recommended or required reading:

Depends on the subjects in which the student is practising.

Assessment methods and criteria:

Presence teaching and independent work

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass/fail

Person responsible:

Sari Eskola, Hellevi Kupila and Emilia Manninen

Working life cooperation:

Yes. Teaching practice.

300003Y: Activities in university and student organizations, 1 - 4 op

Voimassaolo: 01.01.2010 -

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Faculty of Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

Ei opintojaksokuvauksia.

300002M: Advanced Information Skills, 1 op

Voimassaolo: 01.08.2009 -

Opiskelumuoto: Other Studies

Laji: Course

Vastuuyksikkö: Faculty of Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Ursula Heinikoski

Opintokohteen kielet: Finnish

ECTS Credits:

1 ECTS credit

Language of instruction:

Finnish

Timing:

Intended for degree students working on their diploma/master's thesis. The course unit is held once in the autumn and once in the spring semester.

Learning outcomes:

Students know the different phases of scientific information retrieval process and basic techniques of systematic information search. They will find the most important reference databases of their discipline and know how to evaluate information sources and search results.

Contents:

Scientific information retrieval, evaluation of search results and information sources, information search on subject areas of diploma/master's thesis.

Mode of delivery:

Blended teaching

Learning activities and teaching methods:

Lectures 10 h, self-study 17 h

Target group:

The course is optional for students of Science and Technology.

Recommended or required reading:

Web learning material:

<http://libguides oulu.fi/tieteellinentiedonhankinta>

<http://libguides oulu.fi/julkaisujenarviointi>

Assessment methods and criteria:

Passing the course requires participation in the lectures and successful completion of the course assignments.

Grading:

pass/fail

Person responsible:

Library information specialists, informationservice(at)oulu.fi

750033Y: Tutorial for new students, 1 op

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Vanhatalo, Minna-Liisa

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

1 ECTS credit / 27 hours of work

Language of instruction:

Finnish.

Timing:

B.Sc. 3rd autumn / M.Sc. 1st autumn.

Learning outcomes:

Course develops students' skills to guide, make presentations, work in group and organize. It also advances planning, arrangement and guidance abilities as well as responsibility.

Contents:

The student guides a group of new students during the orientation course introducing them to the university, academic learning environment, the department, curriculum and other students with the help of small group meetings and presentations.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Tutorials and presentations. Minimum 15 hours. In addition independent work includes the preparation of the tutorials.

Target group:

Second and third year biology students.

Prerequisites and co-requisites:

Course 750031Y.

Recommended optional programme components:

-

Recommended or required reading:

Study guide and training material.

Assessment methods and criteria:

Tutoring report.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Ph.Lic. Minna Vanhatalo.

Working life cooperation:

No.

Other information:

-

750656S: Final examination in biology, 10 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

751699S	Final examination in zoology	10.0 op
752699S	Final examination in botany	10.0 op
753699S	Final examination in genetics	10.0 op

ECTS Credits:

10 ECTS credits / 267 hours of work.

Language of instruction:

Depending on the book, exam answers Finnish / English.

Timing:

M.Sc. 1st or 2nd year.

Learning outcomes:

Student will understand profoundly own major's essential methods, results and theories.

Contents:

Exam books have to be agreed with the professor in beforehand.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Book exam (4 h). Exam is held in Examinarium, instructions: <http://www oulu.fi/english/studying/examinarium>

Target group:

TEA, ECO and BS: compulsory.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Examination on selected literature of a specific subject.

Exam books has to be agreed in beforehand with the professor.

MAJOR ECOLOGY

Animal ecology orientation (prof. Markku Orell):

- Begon, M., Townsend, C.R. & Harper, J.L. 2006: Ecology. From Individuals to Ecosystems. - Blackwell, 658 p., (8 ECTS)
 - Ridley, M. 2004: Evolution - Blackwell, 198 p. (pp. 347-520 ja 590-613), (2 ECTS) OR
 - Futuyma, D.J. 2005: Evolution - Sinauer, 200 p. (chapters 2-6, 13, 15-16, 21), (2 ECTS).
- Or other literature agreed with the professor

Plant ecology orientation (prof. Jari Oksanen):

- Schultze, E.-D., Beck, E., K. Muller-Hohenstein. 2002. Plant ecology. Springer.
 - Crawford, R.M.M. 2008. Plants at the margin. Cambridge. (Professor needs a copy of the book in order to make the exam questions)
 - Keddy, P.A. Plants and Vegetation. Origin, processes, consequences. Cambridge.
 - Chapin, Matson & Mooney 2002. Principles of terrestrial ecosystem ecology. Springer.
- Or other literature agreed with the professor

MAJOR BIOSCIENCE

Genetics orientation (prof. Outi Savolainen):

- Lewin Genes (XI) (or equal)

Some part of the book can be replaced with other books for example

- Nielsen, R. ja Slatkin, M. 2013 An introduction to population genetics. Sinauer, 287 p.

Or other literature agreed with the professor, for example human genetics, quantitative genetics or bioinformatics.

Animal physiology orientation (prof. Esa Hohtola):

- Compulsory book: Willmer, Stone, Johnston: Environmental Physiology of Animals, 2nd ed, Blackwell, 754 p. 8 ECTS
- Literature related to the pro gradu thesis 200-250 pages. 2 ECTS

Plant physiology orientation (prof. Hely Häggman)

- Beeckman 2009. Root Development. Annual Plant Reviews 37. - Wiley-Blackwell. ISBN 978-1-4051-6150-3
- Coruzzi Gutierrez 2009. Plant Systems Biology. Annual Plant Reviews 35. - Wiley-Blackwell. ISBN 978-1-4051-6283-8.
- Dickison, W.C. 2000. Integrative plant anatomy. 533 s. ISBN 0-12-215170-4
- Fahn, A. 1990. Plant anatomy. 4. rev. ed. 588 s. ISBN 0-08-037490
- Gan 2007. Senescence processes in plants. - Wiley-Blackwell. ISBN 978-0-8138-1963-1
- Hayat, Mori, Pichtel & Ahmad 2010. Nitric oxide in plant physiology. - Wiley-Blackwell. ISBN 978-3-527-32519-1
- Hvoslef-Eide, A.K. & Preil, W. 2005. Liquid culture systems for in vitro plant propagation. Springer ISBN 1-4020-3199-8
- Jenks & Wood 2009. Genes for Plant Abiotic Stress. - Wiley-Blackwell. ISBN 978-1-4051-3984-7
- Knight, Perroud, Cove 2009. The Moss Physcomitrella- Annual Plant Reviews, volume 36 - Wiley-Blackwell. ISBN 978-1-4051-8189-1.
- Lambers, H., Chapin III, F.S., Pons, T.L. 2008. Plant physiological ecology. Springer. 610 p. ISBN 978-0-387-78340-6
- Osbourn, A.E. & Lanzotti, V. 2009. Plant-derived natural products: synthesis, function, and application. 587 s. Springer. (Printed or electronic book version in the library)
- Parker 2008. Molecular aspects of plant disease resistance. Annual Plant Reviews, volume 34. - Wiley-Blackwell. ISBN 978-1-4051-7532-6
- Reed, B.M. 2008. Plant Cryopreservation: A Practical Guide. Springer ISBN 978-0-387-72275-7
- Smith & Read 2008. Mycorrhizal symbiosis. 3. painos. Academic Press. 800 p.
- Taiz, L. & Zeiger, E. 2010. Plant Physiology. Fifth Edition. 782 p. Sinauer Associates, Inc. ISBN-10: 0878938664
- Wink 2010. Biochemistry of plant secondary metabolism. Annual Plant Reviews, volume 40. - Wiley-Blackwell. ISBN 978-1-4051-83970. Electronic book. Link can be found for example from OULA library catalogue. Dawsonera can be accessed with koivu/paju password. <http://www.dawsonera.com/depp/reader/protected/external/AbstractView/S9781444320510>
- Yeo & Flowers 2007. Plant Solute Transport. - Wiley-Blackwell. ISBN 978-1-4051-3995-3
- Yoshioka & Shinozaki 2009. Signal Crosstalk in Plant Stress Responses - Wiley-Blackwell. ISBN 978-0-8138-1963-1

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Book exam in biology public exam day. Read more about [assessment criteria](#) at the University of Oulu webpage.

Exam in Examinarium: <http://www.oulu.fi/english/studying/examinarium>

Grading:

1-5 / Fail.

Person responsible:

M.Sc. Henrika Honkanen, Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

750678S: Master of science seminar, 5 op**Voimassaolo:** 01.08.2015 -**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Field of Biology**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

750696S Master of science seminar 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st - 2nd year.

Learning outcomes:

The seminar gives advanced scientific communication and information retrieval skills.

Contents:

Instructions for the M.Sc. thesis and interactive reporting of the work in progress.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Student will give two seminar presentations and one research seminar and one result seminar presentation opposing, eight research seminar and eight result seminar attendances. Research plan seminar and results seminar presentations cannot be given at same day. Topics and dates have to be agreed with the professor in beforehand. See degree programme notice board for the schedule and instructions.

Target group:

Compulsory to the biology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Seminar presentations, attendance and opposing. Detailed instructions on the degree programme's notice board.

Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

Pass / Fail.

Person responsible:

Prof. Markku Orell.

Working life cooperation:

No.

Other information:

-

750632S: Maturity exam, 0 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

0 ECTS credits / 1 hours of work.

Language of instruction:

Finnish / Swedish / English.

Timing:

M.Sc. degree.

Learning outcomes:

Student will present and analyze research material, methods and results.

Contents:

After completing the Master of Science Thesis, the student will give summary in Finnish, Swedish or English to show his/her familiarity with the topic of the thesis. If the international degree student has not done a maturity exam in her /his B.Sc. degree the student has to make a 4 pages long essay about the thesis subject in Examinarium.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Instructions at the Faculty of Science internet homepage. One teacher examine the maturity exam and Pro gradu working group accepts it.

Target group:

Compulsory to the biology students. After completing the thesis.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Summary form at the Faculty of Science internet homepage.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

750658S: Pro gradu thesis in biology, 40 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

755602S Master of science thesis in zoology 40.0 op

756602S Pro gradu thesis 40.0 op

757602S Master of science thesis in genetics 40.0 op

ECTS Credits:

40 ECTS credits / 1067 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st or 2nd year.

Learning outcomes:

Student knows the research methods in specific field of biology. She is conversant with her field of thesis and is able to scientific thinking, estimating the results, analysing, drawing conclusions and scientific communicating.

Contents:

Literary work which in general includes experimental research work. Student gets profoundly acquainted on certain special field in biology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Independent research work on a scientific subject in agreement with the responsible professor and under the supervision of the Department. The supervisors may be professors of the department, docents and other teachers and researchers who have the docent's status. The student may have several supervisors, the other supervisor may be from other department, university (also abroad) or from research institute. The subject must be agreed on with the professor in advance. The research work can contain fieldwork, laboratory work, theoretical work or work on collections in museum. The work always includes a literature survey. After having completed the thesis, the student writes the Maturity Exam. The programme director will order the final examiners by the proposal of the professor. Pro gradu working group accepts and grades the thesis on the basis of the final examiners' opinions.

Target group:

ECO and BS: compulsory 40 cr. TEA: 40 cr. optional. So called didactic pro gradu thesis cannot be 40 cr.

Prerequisites and co-requisites:

Sufficient amount of basic and subject level studies in order to be able to do independent research work.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Literary work.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

M.Sc. Henrika Honkanen, Prof. Hely Häggman, prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

Thesis is made in research groups.

Other information:

-

756650S: Introduction to molecular ecology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kvist, Laura Irmeli, Tanja Pyhäjärvi

Opintokohteen kielet: English

Leikkaavuudet:

750645S Molecular ecology 2.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

English.

Timing:

B.Sc. 2nd spring BSc, M.Sc. 1st spring, ECOGEN ECO and BS. Introduction to Population genetics compulsory to B.Sc. in M.Sc. degree.

Learning outcomes:

This course introduces genetic theories, basics of phylogenetics and usage of molecular biology methods in ecology. The aim is that students know the basic methodology, can apply them into variety of genetic and ecological questions and is familiar with basics of population genetics and phylogenetics in order to be able to analyze and interpret genetic data.

Contents:

Basics of population genetics (variation, effective population size, bottlenecks, population structure, gene flow), relationships between molecular and adaptive variation, phylogenetic methods and phylogeography. Usage of molecular methods for identification of species, sex and individuals, behavioural ecology (mating systems, cooperation, mating success) and conservation.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Population genetics: 20 h lectures, 4 h seminars, 24 h exercises (problem solving, laboratory and computer exercises), report, essays, home exam, final exam.

Molecular ecology: 20 h lectures, 4 h seminars, 36 h exercises (laboratory and computer exercises), final exam.

Target group:

B.Sc.: BS optional 2nd spring; M.Sc.: 1st spring BSc compulsory. ECOGEN: BS and ECO.

Prerequisites and co-requisites:

Concepts of genetics (757109P) and Experimental course in general genetics (757110P) and Molecular evolution (757312A) or equivalent knowledge.

Recommended optional programme components:

Population genetics BS: Recommended prerequisite for course Quantitative genetics and plant and animal breeding (757616S). Compulsory prerequisite for courses Experimental course in evolutionary genomics (757621S), Advanced course in bioinformatics (757619S) and DNA analysis in population genetics (757618S).

Molecular ecology ECO: Basics in population ecology (756351A) and Advanced course in population ecology (75626S).

Recommended or required reading:

Hedrick 2005: Genetics of populations 3. or 4. ed. Beebe, T and Rowe G. 2004 or 2008. An introduction to molecular ecology. Oxford University Press.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Population genetics: Home exam, final exam, seminar, essays, reports.

Molecular ecology: Final exam and seminar.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Laura Kvist and Doc. Tanja Pyhäjärvi.

Working life cooperation:

No.

Other information:

Note that Introduction to Molecular ecology and Introduction to population genetics courses are alternative; students cannot get credits from both.

755625S: Methods in ecology I, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Koivula

Opintokohteen kielet: English

Leikkaavuudet:

750644S Methods in ecology I 6.0 op

ECTS Credits:

5 cr / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

ECOGEN 1. autumn.

Learning outcomes:

Students are familiar to scientific method and can separate scientific information from other contents of culture. Students have learned to assess the uncertainty of information and can evaluate the quality of information with respect to its applied value. Students also learn to build a valid theoretical or empirical strategy to solve scientific problems.

Contents:

The aim of the course is to introduce the students in scientific modes of argumentation and research methods in modern ecology. Both the empirical and theoretical methods and their relationship in theory formation are discussed. Hypothesis testing; observational method, experimental method and comparative method are the empirical methods introduced. Autumn period ends in a seminar where scientific publications are analysed.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures, seminar, exercises and exam.

Target group:

Compulsory to ECOGEN ECO.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Kari Koivula, Doc. Seppo Rytkönen and Prof. Markku Orell.

Working life cooperation:

No.

Other information:

-

755629S: Methods in ecology II, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Seppo Rytkönen, Jari-Heikki Oksanen

Opintokohteen kielet: English

Leikkaavuudet:

750647S Methods in ecology II 7.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Lectures Finnish / English, exercises also in English.

Timing:

ECOGEN ECO 1st spring.

Learning outcomes:

The aim of the course is to learn in practice how to apply scientific method in ecological research. The student learns how to select appropriate methods for different ecological problems, and a toolkit for study design and data analysis.

Contents:

Continuation to course Ecological methods I 5 cr (755325A, 755625S). This course focuses on applying the scientific method in ecological research. The course consists mainly of computer exercises in the following subjects: sampling, sample size determination, experimental design and statistical analysis esp. analysis of variance, comparative methods (independent contrasts - analysis), multivariate methods (cluster analysis, ordination) and meta-analysis. Also other current issues can be included.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures 8 h, 40 h exercises, independent work and exam.

Target group:

ECOGEN ECO compulsory.

Prerequisites and co-requisites:

Course Ecological methods I 5 cr (755325A). Recommended: Introduction to Statistics 5 cr (806118P) and A second course in statistics 5 cr (806119P).

Recommended optional programme components:

-

Recommended or required reading:

Reading package at course wiki-pages.

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Seppo Rytkönen and Prof. Jari Oksanen.

Working life cooperation:

No.

Other information:

-

H750600: EcoGen optional advanced level studies in ecology major, 10 - 80 op

Voimassaolo: 01.08.2016 -

Opiskelumuoto: Advanced Studies

Laji: Study module

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

Choose from

750653S: Special seminar in biology, 2 - 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

755616S	Seminars on special topics in zoology	2.0 op
753613S	Special seminar in genetics	4.0 op
752695S	Seminar on special topics in botany	2.0 op
753630S	Genetics research seminar	2.0 op
754618S	Research seminar in fish ecology	2.0 op

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

2-5 ECTS credits / 53-133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc., or Ph.D. degree. Arranged if resources allow.

Learning outcomes:

Students will be acquainted to current issues in biology.

Contents:

Seminars on current issues in biology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Course specific.

Target group:

Biology students.

Prerequisites and co-requisites:

Varying.

Recommended optional programme components:

-

Recommended or required reading:

Varying.

Assessment methods and criteria:

Course specific.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail or Pass / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen and docents.

Working life cooperation:

No.

Other information:

-

750654S: Special lecture in biology, 2 - 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

752667S Special topics in plant ecology 2.0 op

751690S Lectures on special topics in zoology 2.0 op

ECTS Credits:

2-5 ECTS credits / 53-133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. or Ph.D. degree. Arranged if resources allow

Learning outcomes:

Students will be acquainted to current issues in biology.

Contents:

Seminars on current issues in biology.

Mode of delivery:

Varying.

Learning activities and teaching methods:

Varying.

Target group:

Biology students.

Prerequisites and co-requisites:

Varying.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Varying.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail or Pass / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen ja dosentit.

Working life cooperation:

No.

Other information:

-

750615S: Practical training, 10 - 15 op

Opiskelumuoto: Advanced Studies

Laji: Practical training

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

10-15 ECTS credits / 380-570 hours of traineeship work.

Language of instruction:

Finnish / English.

Timing:

Registration B.Sc. 3rd autumn, training B.Sc. 3rd summer - M.Sc. 1st autumn.

Learning outcomes:

The aim of the course is for students to gain work experience in their own field of biology. Student applies the theoretical knowledge gained during the studies in practice.

Contents:

Minimum training period is two months full day work 10 cr. Students can obtain 15 credits for three months versatile training depending on the length and intensity of it. Student can do the training period in Finland or during her/his exchange period or train otherwise abroad.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

The trainee has to keep a journal of the work and its background factors. This journal and a summary of 6-8 pages have to be handed in to the responsible contact person after the training period. The summary should contain information on the training place, the ongoing research, the trainee's own work and its results. The journal is returned to the student after the summary has been approved. The student has also to be given a reference of the work. Offered training placements are announced in the internet page of Extension School. Entering for the practical training is made in 3rd autumn. Normally, the student has to find him/herself a placement in public or private sectors or abroad.

Target group:

Compulsory to BS and ECO in the M.Sc. degree.

Prerequisites and co-requisites:

About 80 credit amount of biology courses.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Journal and final report.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Contact person Minna Vanhatalo. The supervisors of the practical training are Prof. Markku Orell (ECOz), Prof. Juha Tuomi (ECOb), Prof. Hely Häggman (BSb), M.Sc. Henrika Honkanen (BSz) and Prof. Outi Savolainen (BSg).

Working life cooperation:

Yes. Participating to biology project gives working life skills.

Other information:

The student has to contact the professor and discuss about the suitability of the internship place in beforehand.

750613S: Research training, 2 - 15 op

Opiskelumuoto: Advanced Studies

Laji: Practical training

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

1-14 ECTS credits / 27-405 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. degree.

Learning outcomes:

Student applies the education given knowledge and skills in working life to gain hands-on experience.

Contents:

Work on special projects in the different biology research groups at the department or elsewhere or independent project work including field and/or laboratory work or work at the biological stations. The work is not included to other study modules in biology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

The topic and the study plan have to be agreed on in advance (registration form). The student has to keep diary and prepare a report on the work.

Target group:

-

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Report.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

Yes. Participating to biology project gives working life skills.

Other information:

-

750661S: Research group seminar, 2 - 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

2-4 ECTS credits / 53-107 hours of work.

Language of instruction:

Finnish / English.

Timing:

Autumn-spring.

Learning outcomes:

Students concern themselves to special features of biological research.

Contents:

Workshop type seminars in different fields of biology help by research groups. Advanced or postgraduate studies. 2 cr. per different seminar series.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

26 h seminars / workshops.

Target group:

M.Sc. or Ph.D. degree.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Active participation to seminars.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

750618S: Thursday seminar in biology, 2 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kuittinen, Helmi Helena

Opintokohteen kielet: English

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

2 ECTS credits / 53 hours of work.

Language of instruction:

English.

Timing:

M.Sc. or Ph.D. degree.

Learning outcomes:

Students get knowledge about the current results and theories in biology.

Contents:

Lectures in English on current topics in biology given by guest lecturers from Finland and abroad.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Guest lectures on Thursdays 12 am-1 pm. See seminar programme: <https://noppa oulu.fi/noppa/kurssi/750618s/etusivu>

Target group:

Undergraduate and postgraduate students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

10 participations and 10 one page long reports. You can combine lectures from different academic terms to make the needed 10 essays.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Doc. Helmi Kuittinen.

Working life cooperation:

No.

Other information:

-

750629S: Kaamos symposium, 2 - 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Muotka, Timo Tapani

Opintokohteen kielet: English

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

2-4 ECTS credits / 53-107 hours of work.

Language of instruction:

English.

Timing:

M.Sc. and Ph.D. autumn.

Learning outcomes:

Students get acquainted to preparing, presenting and evaluating a scientific oral presentation.

Contents:

The Kaamos Symposium consisting of presenting current research projects is held every year at the end of autumn period. Through presenting their research work and projects and obtaining feedback from the audience (students and the staff of the department) post graduate students gain experience in holding a scientific presentation.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Own presentation and the whole symposium 4 cr (postgraduate students). Summary of five presentations and symposium 2 cr (undergraduate students). Poster 2 cr (postgraduate students).

Target group:

Undergraduate biology students (2 cr) and postgraduate biology students (2-4 cr).

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Abstract book.

Assessment methods and criteria:

Presentation or reports.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Prof. Timo Muotka.

Working life cooperation:

No.

Other information:

-

755633S: Identification of animals, 6 op

Voimassaolo: 01.08.2016 - 31.07.2019

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Koivula

Opintokohteen kielet: Finnish

Leikkaavuudet:

755634S Identification of animals, vertebrates 4.0 op

ECTS Credits:

6 ECTS credits / 162 hours of work.

Language of instruction:

Finnish / English

Timing:

ECOGEN 1st autumn and spring.

Learning outcomes:

Main point of the course is to learn to identify Finnish animal species (vertebrate) and families (invertebrate) from museum samples. Basics of species' ecology and classification of organisms.

Contents:

During the autumn semester (9 h lectures in Finnish, 16 h exercises, exam), the Finnish vertebrate fauna is studied using stuffed museum samples. In the spring semester (9 h lectures in Finnish, 16 h exercises, exam) the invertebrate taxons (mostly family- or genus-level) common in Finland are studied using museum samples.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

18 h lectures in Finnish, 32 h exercises, independent studying, 2 exams.

Target group:

ECOGEN.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

This course is needed for attending courses Field course in terrestrial animals (755322A) and Field course in aquatic animals (755321A).

Recommended or required reading:

Course handouts, Itäemies J. ja Viro P. 1995: Eläinten lajintuntemus, selkärangattomat, 73 p.; Putaala, A., Marjakangas, A. & Rytönen, S. 2001: Eläinten lajintuntemus, selkärangaiset, 42 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Two species exams.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Kari Koivula.

Working life cooperation:

No.

Other information:

-

750649S: Examinations on optional topics in biology, 2 - 10 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

751654S	Examination on optional topics	2.0 op
752652S	Examinations on optional topics	2.0 op
753651S	Examinations on optional topics	2.0 op

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

2-10 ECTS credits / 53-267 hours of work.

Language of instruction:

Depending on the book.

Timing:

B.Sc. degree 2.-3. year or M.Sc. degree 1.-2. year.

Learning outcomes:

Student independently concerns him/herself to special issues in biology.

Contents:

Examinations on books, which are not compulsory in any other course unit.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Book exam in Examinarium.

Target group:

-

Prerequisites and co-requisites:

-

Recommended optional programme components:

-

Recommended or required reading:

Literature chosen in agreement with the responsible person.

Assessment methods and criteria:

Book exam in Examinarium.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

750699S: Optional examinations in environmental protection, 2 - 6 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Taulavuori

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

2-6 ECTS credits / 53-160 hours of work. About 100 pages / 1 ECTS credit.

Language of instruction:

Most books are in English.

Timing:

B.Sc. or M.Sc. degree.

Learning outcomes:

To understand environmental protection in global context.

Contents:

Depends on the book.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Three times per both semesters in university exam days. Exam days are announced in WebOodi.

Target group:

Biology, geography, geology, environmental engineering, exchange students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Gaston & Spicer (2004) Biodiversity – an introduction. Blackwell Publishing, 191p; Lockwood et al. (2007) Invasive Ecology, Blackwell Publishing, 304 p; ACIA (2005) Arctic Climate Impact Assessment, Cambridge University Press, 1042 p.; Dincer et al. (2013) Causes, Impacts and Solutions to Global Warming, Springer, 1183 p.

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Kari Taulavuori.

Working life cooperation:

No.

Other information:

Student has to consult about the selected literature before exam.

755621S: Field course in aquatic animals, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Muotka, Timo Tapani, Heikki Mykrä

Opintokohteen kielet: English

Leikkaavuudet:

751607S Field course in aquatic animals 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

ECOGEN ECOz 1st summer.

Learning outcomes:

To learn basic methods in biological freshwater sampling and to identify the most common freshwater taxa.

Contents:

Basics of freshwater ecology. Demonstrations of the most frequently-used biological sampling methods. Identification of the most common freshwater fishes, invertebrates and zooplankton.

Mode of delivery:

Face-to-face teaching and independent studying.

Learning activities and teaching methods:

Summer: 6 h lectures in Oulu and 50 h of field work and demonstrations at the Oulanka research station, reading package and independent studying.

Target group:

ECOGEN.

Prerequisites and co-requisites:

Basic identification of animals (755333A) or equivalent knowledge (if necessary, selection to the course 755321A can be based on success in course 755333A).

Recommended optional programme components:

This course is a prerequisite for the following: Winter ecology and physiology (750377A), Special course in aquatic invertebrates (754627S), Assessment and monitoring of the ecological status of water bodies (754625S), Field methods in freshwater biomonitoring (754626S).

Recommended or required reading:

Reading package, handouts and lectures given before / during the course.

Assessment methods and criteria:

On the final course day species identification exam on the species met during the course, practical exam on the sampling methods and theoretical exam based on the literature and demonstration material. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Timo Muotka.

Working life cooperation:

No.

Other information:

-

755622S: Field course in terrestrial animals, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Seppo Rytönen

Opintokohteen kielet: English

Leikkaavuudet:

751606S Field course in terrestrial animals 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

ECOGEN ECOz 1st summer.

Learning outcomes:

The aim of the course is to learn the basics of field identification and ecology of terrestrial animals in northern Finland. The student will understand that proper skills in species identification and knowledge of species' ecology are the basis of ecological research.

Contents:

The fauna in different kinds of terrestrial habitats is studied using several ecological sampling and research methods. The course is held at the Oulanka Research Station, Kuusamo, and deals with identification and

ecology of invertebrates, mammals (especially small mammals), gallinaceous birds and birds of prey. The exercises take place partly in the field and partly in the laboratory. Data gained during the course is analyzed. The results are reported (in PowerPoint) and presented in the final seminar in Kuusamo.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Part 1. (Oulu): 2 h demonstrations, independent studying. Part 2. (Oulanka): 49 h exercises and demonstrations, species and theory exam, seminar.

Target group:

ECOGEN.

Prerequisites and co-requisites:

Basic identification of animals (755333A) or equivalent knowledge.

Recommended optional programme components:

This course is a prerequisite to course Winter ecology and physiology (750377A).

Recommended or required reading:

Compulsory at Oulanka: 1) Rytkönen, S. ym. 2003: 751306 Maaeläimistön tuntemus ja ekologia. - Biologian laitoksen monisteita 3/2003. Oulun yliopisto, Oulu. 2) Pentinsaari, M. ym. 2015: Eläinten lajintuntemus, selkärangattomat. Oulun yliopisto, Oulu. Insect book recommended: Chinery, M. 1988 Pohjois-Euroopan hyönteisheimojen määrittäminen, Tammi, Helsinki, 2. painos.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Theory exam, species identification exam, seminar presentation.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Seppo Rytkönen.

Working life cooperation:

No.

Other information:

Binoculars, bird identification book, suitable outfit. Preparation knife, preparation scissors and sharp cusp tweezers.

756647S: Conservation of biodiversity, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Phillip Watts

Opintokohteen kielet: English

Leikkaavuudet:

750621S Conservation of biodiversity 3.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

English.

Timing:

M.Sc. ECOGEN.

Learning outcomes:

Students know the central concepts of biodiversity, threats to biodiversity, and methods of conservation of biodiversity.

Contents:

Biodiversity and its components. Major theories of the ecological control of biodiversity. Habitat fragmentation and habitat destruction and their consequences. Metapopulation theory and networks of nature reserves. Current issues in the conservation of biodiversity.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

14 h lectures, literature, exam.

Target group:

ECOGEN students (code S). Other students (code A).

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Hanski I. 2005: The Shrinking World. International Ecology Institute, Oldendorf/Luhe, Germany. The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Dr. Phillip Watts.

Working life cooperation:

No.

Other information:

-

755632S: Restoration ecology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Tolvanen, Anne Kristiina, Annamari Markkola

Opintokohteen kielet: Finnish

Leikkaavuudet:

756607S Restoration ecology 2.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. degree.

Learning outcomes:

Lectures: the student understands the ecological principles of restoration and remembers the basics of restoration options in different ecosystems. Exercises and excursion: the student is able to evaluate the need for restoration and possibilities of an ecosystem to regenerate, and apply the restoration techniques in practical restoration planning.

Contents:

Land-use impacts and ecosystem malfunctions caused by humans, ecological principles of restoration, prevention and restoration of manmade damage in the ecosystems. Examples from restoration options and practical techniques in terrestrial and aquatic ecosystems, and cultural landscapes.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

24 h lectures, exercises and an excursion.

Target group:

ECO.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Andre Clewell, James Aronson 2008: Ecological Restoration, Principles, Values, and Structure of an Emerging Profession, Island Press, 230 p. and articles in the Restoration Ecology journal.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

-

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Anne Tolvanen.

Working life cooperation:

No.

Other information:

-

750677S: Winter ecology and physiology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Taulavuori, Orell, Markku Ilmari

Opintokohteen kielet: Finnish

Leikkaavuudet:

750625S Winter ecology and physiology 3.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

English.

Timing:

B.Sc. 3rd or M.Sc. 1st spring. NNE.

Learning outcomes:

Student obtains basic knowledge of animal and plant acclimations and adaptations to winter, and can evaluate the effects of cold temperatures and snow on overwintering, and learns central methodology in winter ecology and physiology.

Contents:

Three independent units: 1) Winter ecology and physiology course (7 h lectures and 13 h laboratory practicals and 4 h seminar in Oulu, and 4 day long field excursion to the Oulanka Research Station (total about 50 h, 3 cr); 2) Book exam on a common exam day 2 cr: Marchand, P. J. 1996: Life in the cold. An introduction to winter ecology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures, exercises, report and seminar presentation.

Target group:

Biology students.

Prerequisites and co-requisites:

Courses Basics of ecology (750124P), Cell biology (750121P), Terrestrial animals field course (755322A), Aquatic animals field course 755321A), Field course in ecological botany (752304A) and Basics of functional plant biology, lectures (756346A) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Marchand, P. J. 1996: Life in the cold. An introduction to winter ecology. (3rd edition). University Press of New England. 304 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Seminar presentation and book exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Course + Seminar: Pass / Fail, book exam: 1-5 / Fail.

Person responsible:

Doc. Kari Taulavuori.

Working life cooperation:

No.

Other information:

-

756648S: Ecological responses to global change and air pollution in the subarctic, 5 - 8 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Taulavuori

Opintokohteen kielet: Finnish

Leikkaavuudet:

750643S Ecological responses to global change and air pollution in the subarctic 4.0 op

ECTS Credits:

5 (- 8) cr / 133 (- 240) hours of work.

Language of instruction:

Finnish / English.

Timing:

B. Sc. / M. Sc. / Ph.D., (excursion arranged if resources allow).

Learning outcomes:

Student can identify the ecological and environmental effects of climate change and air pollution in the subarctic area. In addition, the student may learn basic research methods related to topic, and how to use the facilities provided by the subarctic research stations in the research.

Contents:

Lectures deal the ecological responses of global change and air pollution. The content is focused on the environmental effects and their ecological significance in the northern areas. During excursion the student familiarizes with the special features of northern areas and explores the action and research carried out in the northern research stations.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

1) 24 h lectures with exam, and 15 h independent studies (essay and seminar work) (4 cp); **(2)** 4-5 days summer excursion and closing seminar (3 cp); participation in excursion necessitates accepted credits in the first part (lectures, independent studies).

Target group:

Ecology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-ACIA (2005) Arctic Climate Impact Assessment, Cambridge University Press, 1042 p. -AMAP Assessment 2006: Acidifying Pollutants, Arctic Haze, and Acidification in the Arctic. Arctic Monitoring and Assessment Programme (AMAP), Oslo, Norway. Xii + 112pp. Bell JNB & Trehow M (eds.) 2002. Air pollution and plant life. Wiley. 2nd edition. 480 pages.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Lectures, essay and seminar, excursion, closing report and seminar.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail

Read more about [assessment criteria](#) at the University of Oulu webpage.

Person responsible:

Doc. Kari Taulavuori.

Working life cooperation:

Possible excursion will include tours to the northern research stations.

Other information:

Field excursion is arranged if resources allow.

755624S: Functional animal ecology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Seppo Rytönen

Opintokohteen kielet: Finnish

Leikkaavuudet:

751678S Functional animal ecology 6.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Lectures in Finnish, exercises in Finnish / English.

Timing:

B.Sc. 2 nd spring or M.Sc. 1 st spring. NNE.

Learning outcomes:

The aim of the course is to understand the relationship between morphology and function by the means of general ecomorphological model. The student will get both theoretical and practical basics for ecomorphological (and. general scientific) research procedures: scientific hypothesizing, sampling, data analysis and reporting and interpreting the results.

Contents:

The course focuses on the relationship between phenotype and function, especially the correlation between animal morphology and behaviour. The course consists of two parts: A) Lectures in Finnish. However, articles about each subject are available for foreign students, including ecomorphological models and correlations, measurement error, allometry, fluctuating asymmetry and phylogenetic analyses. B) Exercises consisting of miniature studies, field and laboratory work, and seminar. The results of the mini studies, in form of PowerPoint presentations, are presented in the seminar. Before the exercises, students write a home essay (or take an exam).

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

12 h lectures, 40 h exercises, seminar and essay (or exam).

Target group:

Recommended for ecology students.

Prerequisites and co-requisites:

Recommended Evolution, systematics and morphology of animals, practicals (750374A), Introduction to statistics 5 cr (806118P) and A second course in statistics 5 cr (806119P).

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Essay or exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Seppo Rytönen.

Working life cooperation:

No.

Other information:

-

755628S: Wildlife management and game animal ecology, 5 op**Voimassaolo:** 01.08.2015 -**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Field of Biology**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Kari Koivula, Jouni Aspi**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

751668S Wildlife management and game animal ecology 6.0 op

ECTS Credits:

5 cr / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 3rd autumn or M.Sc. 1st autumn (arranged if resources allow).

Learning outcomes:

After carrying out the study module the student will be able to recognize special ecological traits of the game animals and relate them to the general ecological framework. The student will be also to appraise the basics of durable hunting of game animals. The student will be also able to appraise the basics of durable hunting of game animals and critically judge different wildlife management methods from the scientific starting point.

Contents:

The ecology of game species, their life histories, population dynamics and predator-prey relationships. Hunting ecology: man as predator, management and hunting of the game species. The impact of forestry on the game species' populations. Students are also introduced to wildlife management in practice and to the social aspect of wildlife-human relationship.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

24 h lectures, one-day excursion to a game breeding area, seminar with written reports and exam.

Target group:

-

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Seminar with report and exam.

Grading:

1-5 / Fail.

Person responsible:

Prof. Jouni Aspi ja doc. Kari Koivula.

Working life cooperation:

Yes.

Other information:

-

756644S: Plant ecology, 5 - 7 op**Voimassaolo:** 01.08.2015 -**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Field of Biology**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Annamari Markkola, Kari Taulavuori**Opintokohteen kielet:** English**Leikkaavuudet:**

752600S Plant ecology 7.0 op

ECTS Credits:

5 cr / 133 hours of work.

Language of instruction:

Lectures Finnish, Exercises Finnish / English.

Timing:

ECOGEN 1st autumn.

Learning outcomes:

Student will get basic knowledge how plants adapt to different environmental factors.

Contents:

The main subject of this course is the heterogeneity of environment and the capacity of plants to adapt flexibly to different light and nutrient conditions. For carbon economy the main questions are variation in photosynthetic potential, extrinsic factors which restrict the photosynthesis and the structural and physiological adaptations to different light conditions. Nutrient economy is not only dependent on the soil of the habitat but also on the capacity of plant to change the ions from the surface of soil particles. Symbiosis has a great importance on nutrient economy of boreal plants. The balance between benefits and costs defines whether the symbiosis with the nitrogen fixation bacteria or with mycorrhizal fungi is beneficial for the plant or not. There is competition between plants for soil nutrients and for light. How is it possible that plants competing for the same basic nutrients can live in the same habitat? Isn't the niche theory valid for plants?

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

(1) 24 h lectures and exam; (2) 10 h seminars on the literature of plant ecology; (3) 30 h demonstrations and exercises in field and laboratory (basic methods in plant ecology and laboratory work) and 4 h final seminars. International students will compensate lectures by reading book Ridge, I. 2002: Plants, Oxford Univ. Press.

Target group:

ECOGEN ECO optional.

Prerequisites and co-requisites:

Basics of ecology (750124P) and Field course in ecological botany (756343A) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Ridge, I. 2002: Plants.

The availability of the literature can be checked from [this link](#).**Assessment methods and criteria:**

Lecture exam, laboratory diary and seminar presentation.

Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

1-5 / Fail.

Person responsible:

Doc. Kari Taulavuori ja doc. Annamari Markkola (lectures), doc. Kari Taulavuori (exercises).

Working life cooperation:

No.

Other information:

-

756642S: Identification of plant species, 3 - 4 op

Voimassaolo: 01.08.2015 - 31.07.2017

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Annamari Markkola

Opintokohteen kielet: English

Leikkaavuudet:

752603S Identification of plant species 3.0 op

ECTS Credits:

3-4 ECTS credits / 80-107 hours of work.

Language of instruction:

English.

Timing:

M.Sc. 1st autumn ECOGEN ECOB.

Learning outcomes:

Student is able to identify most common boreal plant species in herbarium specimens.

Contents:

Demonstrations (16 h) and/or independent study of ca. 350 vascular plants, mosses and lichens in the boreal vegetation zone. 4 cr without the literature in the exam and 3 cr with the literature in the exam. In the identification exam student has to know specimens scientific name and family in latin.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

16 h demonstrations and learning from the herbarium samples. In the identification exam student has to know specimens scientific name and family in latin.

Target group:

ECOGEN.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

Course done as 4 cr is prerequisite for the Field course in ecological botany (756643S) and for the advanced plant species identification courses.

Recommended or required reading:

Booklet Hanhela, P. & Halonen, P. 1995: Plant Identification.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Species exam. 4 cr without the course handout and 3 cr with the handout.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Annamari Markkola.

Working life cooperation:

No.

Other information:

-

756643S: Field course in ecological botany, 5 op**Voimassaolo:** 01.08.2015 -**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Field of Biology**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Annamari Markkola**Opintokohteen kielet:** English**Leikkaavuudet:**

752604S Field course in ecological botany 5.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

ECOGEN 1st summer.

Learning outcomes:

Student is able to identify most common boreal plant species in the field, to plan and conduct ecological field experiments and use basic methods in vegetation analyses.

Contents:

Vegetation in the coast of Bothnian Bay in Hailuoto and/or Oulu (4 days). Basics of boreal forest and mire vegetation classification and types at Oulanka Research Station (8 days). Vegetation research and basic methods of stock estimation. Mire vegetation development and ecological biodiversity.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures 10 h, field demonstrations and laboratory exercises, excursions 84 hours in Oulu and/or Hailuoto and Oulanka Research Station. Field exams for plant identification and mire ecology, report.

Target group:

ECOGEN.

Prerequisites and co-requisites:

Identification of plant species (756342A) 4 cr or equivalent knowledge.

Recommended optional programme components:

Course has capacity for 32 or 40 students. Possible elimination of the candidates is done by study success and Plant identification (752603S) grade. This course is a prerequisite for courses Plant ecology (752600S), Mire ecology (752692S) and Field course in Arctic-Alpine ecology and vegetation (752642S).

Recommended or required reading:

Laitinen et al. 2012: Field course in ecological botany; Hanhela, P. & Halonen, P. 1995: Plant identification; Huttunen, A: 1995: Introduction to forest types; Eurola, S., Hicks, S. and Kaakinen, H. 1994: Key to Finnish mire types, pp. 12-117 in: Moore, P. D. (ed.), 1994 European mires, London Academic Press, London, 367 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Field exams, report.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Annamari Markkola.

Working life cooperation:

Yes.

Other information:

-

756612S: Soil ecology, 3 - 5 op

Voimassaolo: - 31.07.2019

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Annamari Markkola

Opintokohteen kielet: Finnish

ECTS Credits:

3-5 ECTS credits / 80-133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st or 2nd year spring, (arranged if resources allow).

Learning outcomes:

Student will learn common basics of soil organisms and their interactions.

Contents:

Current soil ecological research and methods, planning and conducting experiments.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures, exercises, seminars, exam.

Target group:

-

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Additional reading Smith, S.E. & Read, D.J. 1997. Mycorrhizal symbiosis. Academic Press, San Diego and London. 605 p.; Van der Heijden, M.G.A. & Sanders, I.R. (eds) 2002. Mycorrhizal ecology. Springer, Berlin.

469 p.; Bardgett, R. D. 2005. The biology of soil: a community and ecosystem approach. Biology of Habitats series. Oxford University Press, Oxford, UK. 256 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Annamari Markkola.

Working life cooperation:

No.

Other information:

-

756604S: Plant ecophysiology in changing environments, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Taulavuori

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 3rd or M.Sc. 1st spring.

Learning outcomes:

After finishing the course student understands interactions between plant and environment, and has become acquainted to most important experimental methods in physiological plant ecology and student can apply research parameters. Student can apply the knowledge to plant production and environmental protection issues.

Contents:

The aim of the course is to initiate the students into the basics of plant ecophysiology in changing environments. The physical, chemical (abiotic) and biotic factors in the environment affects plant's growth and survival. Plant ecophysiology is an experimental science, which studies the physiological functions and adjustments underlining the ecological observations from the viewpoint of growth and survival. Different environmental stresses restrict the plant growth. Plant ecophysiology is experimental science which studies the physiological functions and regulation mechanisms on growth, survival, abundance and distribution. Effects of abiotic and biotic factors are studied. How elevated temperature, CO₂, drought stress, nutrient imbalance, air pollutants, metals, UV radiation and plant pathogens affect on plants' gas exchange, primary metabolism, carbon allocation and growth. The exercises can also focus on the effects of environmental factors on photosynthesis, respiration, transport of photosynthetic products, water economy, energy economy and nutrient economy. Special features of ecophysiology of boreal plants are also dealt with.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

20 h lectures and demonstrations, 35 h exercises, exam and report.

Target group:

ECOb, BSb, Ph.D. students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

Course is related both to plant ecology and plant physiology basic studies.

Recommended or required reading:

Hans Lambers, F. Stuart Chapin III, Thijs L. Pons 2008: Plant Physiological Ecology. Springer Verlag. 540 s. Second edition.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Seminar and report.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Dr. Kari Taulavuori.

Working life cooperation:

No.

Other information:

-

752616S: Macro fungi, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

3 ECTS credits / 80 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 3rd autumn. NNE.

Learning outcomes:

Student is able to identify most common macrofungal species as fresh specimens and knows basics of fungal ecology.

Contents:

Demonstrations of macrofungi in the field, basics of identification, ecology and distribution.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

14 h lectures, 25 h exercises including excursions, identification exam.

Target group:

Optional course.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Course handout, Salo, P. and Nummela-Salo, U. 2002: Sienikurssi (752316). Toinen uusittu painos. Lajiesittelyt. Biologian laitoksen monisteita 2/2002, 41 p. and mushroom guides.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Species exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Annamari Markkola.

Working life cooperation:

No.

Other information:

-

752656S: Taxonomy and ecology of plants, 2 - 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

2-4 ECTS credits / 53-107 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st or 2nd year. Arranged if resources allow every second year. See WebOodi.

Learning outcomes:

By passing this course a student is able to identify species of the given taxonomic group, understand the ecology of the species, and know their distribution and systematic position.

Contents:

A laboratory course, field course or blended course. Species identification by means of macroscopic or microscopic characters. Making a collection of specimens, sampling and handling of the material. Preparation of herbarium specimens. Field instruction on species mapping and quantitative approach. Species' characters (morphological and chemical). Inventory methods on red listed species. Alternative themes (lichens, polypores and other fungi, and bryophytes).

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Demonstrations, identification exercises and field exercises.

Target group:

Students of plant ecology.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Material given in the course.

Assessment methods and criteria:

Species exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

doc. Anna Liisa Ruotsalainen.

Working life cooperation:

No.

Other information:

Course subject vary (lichens, polypore and other fungi, bryophytes).

752608S: Advanced identification of plant species I, 6 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Anna Ruotsalainen

Opintokohteen kielet: Finnish

ECTS Credits:

6 ECTS credits / 160 hours of work.

Language of instruction:

Finnish / English

Timing:

B.Sc. 3rd year, M.Sc. 1st year.

Learning outcomes:

Advanced identification of the vascular plants of Finland.

Contents:

Independent studying of herbarium samples. Distribution types of plants in Fennoscandia excluding the Russian parts.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Independent studying of herbarium samples. The course could be examined in two parts: 1) monocots, 2) ferns, dicots and distributions.

Target group:

-

Prerequisites and co-requisites:

Identification of plant species, extensive (756354A) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Hämet-Ahti et al. 1998: Retkeilykasvio (Field Flora of Finland), Ed. 4. Finnish Museum of Natural History, Helsinki. 656 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Species exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Anna Liisa Ruotsalainen.

Working life cooperation:

No.

Other information:

-

752625S: Advanced identification of plant species II, 5 - 8 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Anna Ruotsalainen

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

5-8 ECTS credits / 133-213 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st or 2nd year.

Learning outcomes:

Identification of systematically or ecologically limited groups. For example macrofungi, mosses, lichens, phytoplankton, aquatic, shore, forest, meadow, peatland or fell plants, species of primeval forest and macroscopic plant remains.

Contents:

Identification of systematically or ecologically limited groups from herbarium samples and preparates. Lichens 8 cr., others 5 cr.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Independent studying of herbarium samples or preparations, species exam.

Target group:

Ecology students.

Prerequisites and co-requisites:

Identification of plant species (756342A).

Recommended optional programme components:

-

Recommended or required reading:

Literature related to the topic.

Assessment methods and criteria:

Species exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Anna Liisa Ruotsalainen.

Working life cooperation:

No.

Other information:

-

752662S: Botanical collection and digital herbarium, 2 - 6 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Anna Ruotsalainen

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

2-6 ECTS / 53-160 hours of work, 100 species = 2 cr.

Language of instruction:

Finnish / English.

Timing:

B.Sc. or M.Sc. degree.

Learning outcomes:

Preparation (including labels and coordinates) and identification of self-collected botanical specimen.

Contents:

The collection may contain solely vascular plants or together with moss and lichen specimens, for instance.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Vascular plants have to be pressed and dried. The samples have to be in folded paper or small box including the name and place tag. Before starting the collection work student has to consult the teacher.

Target group:

-

Prerequisites and co-requisites:

Identification of plant species (756342A) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Hämet-Ahti et al. 1998: Retkeilykasvio (Field Flora of Finland), Ed. 4. Finnish Museum of Natural History, Helsinki. 656 pp., and other field floras.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Collection is delivered to the person in responsible.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Doc. Anna Liisa Ruotsalainen.

Working life cooperation:

No.

Other information:

Contact the responsible teacher on details.

756649S: Symbiosis, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Anna-Maria Pirttilä

Opintokohteen kielet: Finnish

Leikkaavuudet:

750346A Symbiosis 4.0 op

750646S Symbiosis 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. degree 3rd spring, M.Sc. 1. or 2nd spring, arranged if resources allow.

Learning outcomes:

The student knows the concept of symbiosis, understands the extent of diversity of symbiotic interactions both at the community and molecular level.

Contents:

Lately new forms of symbiosis have been discovered, extending the diversity of symbiotic interactions. Therefore the significance of symbiosis in biotechnology and for example in human health has increased. Various forms of symbiosis, their importance for the host and interaction at the molecular level are covered.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

30 h Lectures / laboratory work / demonstrations, seminar, essay, lecture diary.

Target group:

BS and ecophysiology students.

Prerequisites and co-requisites:

Studies in bioscience.

Recommended optional programme components:

-

Recommended or required reading:

Lecture notes.

Assessment methods and criteria:

Seminar, essay, lecture diary.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Anna Maria Pirttilä.

Working life cooperation:

No.

Other information:

-

030008P: Information Skills for foreign degree students, 1 op

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Technology

Arvostelu: 1 - 5, pass, fail

Opettajat: Ursula Heinikoski, Sassali, Jani Henrik

Opintokohteen kielet: English

ECTS Credits:

1 ECTS credit

Language of instruction:

English

Timing:

The course unit is held in the autumn and spring semester.

Learning outcomes:

Students know the different phases of scientific information retrieval process and basic techniques of systematic information search. They will find the most important reference databases of their discipline and know how to evaluate information sources and search results.

Contents:

Retrieval of scientific information, the search process, key databases of the discipline, and evaluation of information retrieval and information sources.

Mode of delivery:

Blended teaching: classroom training, web-based learning material and exercises in Optima environment, a final assignment on a topic of the student's own choice

Learning activities and teaching methods:

Training sessions 8h, self-study 19h

Target group:

The course is aimed at degree students of science and technology. The course is compulsory for the Master's Degree Programme (BCBU) in Environmental Engineering (BEE).

Prerequisites and co-requisites:

It is recommended that the student knows the basic services of Oulu University Library. The student can participate in the Library ABC -training (<http://www oulu.fi/library/libraryabc>).

Recommended optional programme components:

-

Recommended or required reading:

Web learning material: <http://libguides oulu.fi/findinginformation>

Assessment methods and criteria:

Passing the course requires participation in the training sessions and successful completion of the course assignments.

Grading:

pass/fail

Person responsible:

Library information specialists, [informationservice\(at\)oulu.fi](mailto:informationservice(at)oulu.fi)

Working life cooperation:

-

Other information:

-

757611S: Molecular methods I, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kuittinen, Helmi Helena

Opintokohteen kielet: English

Leikkaavuudet:

750664S Molecular methods I 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

ECOGEN 1st autumn.

Learning outcomes:

After the course the student is able to use the basic methods of DNA work. The student can isolate DNA from different organisms, estimate the quality and quantity of the DNA, amplify DNA fragments with the polymerase chain reaction, design PCR primers and sequence DNA. The student is able to evaluate his results and optimize methods to some degree. The student can write a simple scientific report.

Contents:

Isolation of genomic DNA, amplification of DNA with PCR, primer design, DNA sequencing with the Sanger dideoxy method from a PCR product and from a cloned material. Computer programs needed for DNA-sequence and fragment analysis. Basic elements of a scientific report.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

48 h exercises including demonstrations, 85 h independent work including homework and reports.

Target group:

ECOGEN compulsory.

Prerequisites and co-requisites:

Concepts of genetics (757110P) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Reports.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail

Person responsible:

Doc. Helmi Kuittinen.

Working life cooperation:

No.

Other information:

-

750656S: Final examination in biology, 10 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

751699S	Final examination in zoology	10.0 op
752699S	Final examination in botany	10.0 op
753699S	Final examination in genetics	10.0 op

ECTS Credits:

10 ECTS credits / 267 hours of work.

Language of instruction:

Depending on the book, exam answers Finnish / English.

Timing:

M.Sc. 1st or 2nd year.

Learning outcomes:

Student will understand profoundly own major's essential methods, results and theories.

Contents:

Exam books have to be agreed with the professor in beforehand.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Book exam (4 h). Exam is held in Examinarium, instructions: <http://www oulu.fi/english/studying/examinarium>

Target group:

TEA, ECO and BS: compulsory.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Examination on selected literature of a specific subject.

Exam books has to be agreed in beforehand with the professor.

MAJOR ECOLOGY**Animal ecology orientation (prof. Markku Orell):**

- Begon, M., Townsend, C.R. & Harper, J.L. 2006: Ecology. From Individuals to Ecosystems. - Blackwell, 658 p., (8 ECTS)
 - Ridley, M. 2004: Evolution - Blackwell, 198 p. (pp. 347-520 ja 590-613), (2 ECTS) OR
 - Futuyma, D.J. 2005: Evolution - Sinauer, 200 p. (chapters 2-6, 13, 15-16, 21), (2 ECTS).
- Or other literature agreed with the professor

Plant ecology orientation (prof. Jari Oksanen):

- Schultze, E.-D., Beck, E., K. Muller-Hohenstein. 2002. Plant ecology. Springer.
 - Crawford, R.M.M. 2008. Plants at the margin. Cambridge. (Professor needs a copy of the book in order to make the exam questions)
 - Keddy, P.A. Plants and Vegetation. Origin, processes, consequences. Cambridge.
 - Chapin, Matson & Mooney 2002. Principles of terrestrial ecosystem ecology. Springer.
- Or other literature agreed with the professor

MAJOR BIOSCIENCE**Genetics orientation (prof. Outi Savolainen):**

- Lewin Genes (XI) (or equal)

Some part of the book can be replaced with other books for example

- Nielsen, R. ja Slatkin, M. 2013 An introduction to population genetics. Sinauer, 287 p.

Or other literature agreed with the professor, for example human genetics, quantitative genetics or bioinformatics.

Animal physiology orientation (prof. Esa Hohtola):

- Compulsory book: Willmer, Stone, Johnston: Environmental Physiology of Animals, 2nd ed, Blackwell, 754 p. 8 ECTS
- Literature related to the pro gradu thesis 200-250 pages. 2 ECTS

Plant physiology orientation (prof. Hely Häggman)

- Beeckman 2009. Root Development. Annual Plant Reviews 37. - Wiley-Blackwell. ISBN 978-1-4051-6150-3
- Coruzzi Gutierrez 2009. Plant Systems Biology. Annual Plant Reviews 35. - Wiley-Blackwell. ISBN 978-1-4051-6283-8.
- Dickison, W.C. 2000. Integrative plant anatomy. 533 s. ISBN 0-12-215170-4
- Fahn, A. 1990. Plant anatomy. 4. rev. ed. 588 s. ISBN 0-08-037490
- Gan 2007. Senescence processes in plants. - Wiley-Blackwell. ISBN 978-0-8138-1963-1

- Hayat, Mori, Pichtel & Ahmad 2010. Nitric oxide in plant physiology. - Wiley-Blackwell. ISBN 978-3-527-32519-1
- Hvoslef-Eide, A.K. & Preil, W. 2005. Liquid culture systems for in vitro plant propagation. Springer ISBN 1-4020-3199-8
- Jenks & Wood 2009. Genes for Plant Abiotic Stress. - Wiley-Blackwell. ISBN 978-1-4051-3984-7
- Knight, Perroud, Cove 2009. The Moss Physcomitrella- Annual Plant Reviews, volume 36 - Wiley-Blackwell. ISBN 978-1-4051-8189-1.
- Lambers, H., Chapin III, F.S., Pons, T.L. 2008. Plant physiological ecology. Springer. 610 p. ISBN 978-0-387-78340-6
- Osbourn, A.E. & Lanzotti, V. 2009. Plant-derived natural products: synthesis, function, and application. 587 s. Springer. (Printed or electronical book version in the library)
- Parker 2008. Molecular aspects of plant disease resistance. Annual Plant Reviews , volume 34. - Wiley-Blackwell. ISBN 978-1-4051-7532-6
- Reed, B.M. 2008. Plant Cryopreservation: A Practical Guide. Springer ISBN 978-0-387-72275-7
- Smith & Read 2008. Mycorrhizal symbiosis. 3. painos. Academic Press. 800 p.
- Taiz, L. & Zeiger, E. 2010. Plant Physiology. Fifth Edition. 782 p. Sinauer Associates, Inc. ISBN-10: 0878938664
- Wink 2010. Biochemistry of plant secondary metabolism. Annual Plant Reviews, volume 40. - Wiley-Blackwell. ISBN 978-1-4051-83970. Electronical book. Link can be found for example from OULA library catalogue. Dawsonera can be accessed with koivu/paju password. <http://www.dawsonera.com/depp/reader/protected/external/AbstractView/S9781444320510>
- Yeo & Flowers 2007. Plant Solute Transport. - Wiley-Blackwell. ISBN 978-1-4051-3995-3
- Yoshioka & Shinozaki 2009. Signal Crosstalk in Plant Stress Responses - Wiley-Blackwell. ISBN 978-0-8138-1963-1

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Book exam in biology public exam day. Read more about [assessment criteria](#) at the University of Oulu webpage.

Exam in Examinarium: <http://www.oulu.fi/english/studying/examinarium>

Grading:

1-5 / Fail.

Person responsible:

M.Sc. Henrika Honkanen, Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

750678S: Master of science seminar, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

750696S Master of science seminar 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st - 2nd year.

Learning outcomes:

The seminar gives advanced scientific communication and information retrieval skills.

Contents:

Instructions for the M.Sc. thesis and interactive reporting of the work in progress.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Student will give two seminar presentations and one research seminar and one result seminar presentation opposing, eight research seminar and eight result seminar attendances. Research plan seminar and results seminar presentations cannot be given at same day. Topics and dates have to be agreed with the professor in beforehand. See degree programme notice board for the schedule and instructions.

Target group:

Compulsory to the biology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Seminar presentations, attendance and opposing. Detailed instructions on the degree programme's notice board. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Prof. Markku Orell.

Working life cooperation:

No.

Other information:

-

750632S: Maturity exam, 0 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

0 ECTS credits / 1 hours of work.

Language of instruction:

Finnish / Swedish / English.

Timing:

M.Sc. degree.

Learning outcomes:

Student will present and analyze research material, methods and results.

Contents:

After completing the Master of Science Thesis, the student will give summary in Finnish, Swedish or English to show his/her familiarity with the topic of the thesis. If the international degree student has not done a maturity exam in her /his B.Sc. degree the student has to make a 4 pages long essay about the thesis subject in Examinarium.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Instructions at the Faculty of Science internet homepage. One teacher examine the maturity exam and Pro gradu working group accepts it.

Target group:

Compulsory to the biology students. After completing the thesis.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Summary form at the Faculty of Science internet homepage.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

750658S: Pro gradu thesis in biology, 40 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

755602S Master of science thesis in zoology 40.0 op

756602S Pro gradu thesis 40.0 op

757602S Master of science thesis in genetics 40.0 op

ECTS Credits:

40 ECTS credits / 1067 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1 st or 2 nd year.

Learning outcomes:

Student knows the research methods in specific field of biology. She is conversant with her field of thesis and is able to scientific thinking, estimating the results, analysing, drawing conclusions and scientific communicating.

Contents:

Literary work which in general includes experimental research work. Student gets profoundly acquainted on certain special field in biology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Independent research work on a scientific subject in agreement with the responsible professor and under the supervision of the Department. The supervisors may be professors of the department, docents and other teachers and researchers who have the docent's status. The student may have several supervisors, the other supervisor may be from other department, university (also abroad) or from research institute. The subject must be agreed on with the professor in advance. The research work can contain fieldwork, laboratory work, theoretical work or work on collections in museum. The work always includes a literature survey. After having completed the thesis, the student writes the Maturity Exam. The programme director will order the final examiners by the proposal of the professor. Pro gradu working group accepts and grades the thesis on the basis of the final examiners' opinions.

Target group:

ECO and BS: compulsory 40 cr. TEA: 40 cr. optional. So called didactic pro gradu thesis cannot be 40 cr.

Prerequisites and co-requisites:

Sufficient amount of basic and subject level studies in order to be able to do independent research work.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Literary work.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

M.Sc. Henrika Honkanen, Prof. Hely Häggman, prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

Thesis is made in research groups.

Other information:

-

757613S: Basics in population genetics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Lumi Viljakainen

Opintokohteen kielet: English

Leikkaavuudet:

753614S Basics in population genetics 8.0 op

ECTS Credits:

5 cr / 133 hours of work.

Language of instruction:

English.

Timing:

B.Sc. 2nd spring BSc, M.Sc. 1st spring, ECOGEN ECOz and ECOB BS. Introduction to Population genetics compulsory to B.Sc. in M.Sc. degree.

Learning outcomes:

This course introduces genetic theories, basics of phylogenetics and usage of molecular biology methods in ecology. The aim is that students know the basic methodology, can apply them into variety of genetic and ecological questions and is familiar with basics of population genetics and phylogenetics in order to be able to analyze and interpret genetic data.

Contents:

Basics of population genetics (variation, effective population size, bottlenecks, population structure, gene flow), relationships between molecular and adaptive variation, phylogenetic methods and phylogeography. Usage of molecular methods for identification of species, sex and individuals, behavioural ecology (mating systems, cooperation, mating success) and conservation.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

22 h lectures, 4 h seminars, 24 h exercises (problem solving, laboratory and computer exercises), take-home exam.

Target group:

Optional to BS in B.Sc. degree, compulsory to BSc and ECOGENgen in M.Sc. degree.

Prerequisites and co-requisites:

Concepts of genetics (757109P), Experimental course in general genetics (757110P) and Molecular evolution (757312A) or equivalent knowledge.

Recommended optional programme components:

Compulsory prerequisite for courses Experimental course in evolutionary genomics (757621S), Advanced course in bioinformatics (757619S) and DNA analysis in population genetics (757618S). Recommended prerequisite for course Quantitative genetics and plant and animal breeding (757616S).

Recommended or required reading:

Hamilton, M. B. 2009: Population genetics, Wiley-Blackwell.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Take-home exam, problem solving, laboratory and computer exercises, seminar.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Lumi Viljakainen.

Working life cooperation:

No.

Other information:

Note that Introduction to population genetics and Introduction to Molecular ecology courses are alternative; students cannot get credits from both.

757618S: DNA analysis in population genetics, 10 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Tanja Pyhäjärvi

Opintokohteen kielet: Finnish

Leikkaavuudet:

753631S	DNA analysis in population genetics, exercises	6.0 op
753616S	Specific questions in population genetic and biology	4.0 op

ECTS Credits:

10 cr / 267 hours of work.

Language of instruction:

English.

Timing:

M.Sc. 1st spring.

Learning outcomes:

Student is able to explain advanced theories in population genetics and analysing methods based on the theories.

Contents:

Coalescent theory, major sequence analysis methods and computer programmes in population genetics. Population structure research.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

24 h lectures, 3 h seminar, 6 h exercises, 24 h computer exercises, 60 h independent work, reports, exam.

Target group:

BTz compulsory.

Prerequisites and co-requisites:

Basics of population genetics (757313A) or Introduction to molecular ecology (756650S) and Basics of bioinformatics (757314A) is recommended.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Lectures, exercises, reports, seminar presentation, independent work.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Tanja Pyhäjärvi.

Working life cooperation:

No.

Other information:

-

757611S: Molecular methods I, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kuittinen, Helmi Helena

Opintokohteen kielet: English

Leikkaavuudet:

750664S Molecular methods I 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

ECOGEN 1st autumn.

Learning outcomes:

After the course the student is able to use the basic methods of DNA work. The student can isolate DNA from different organisms, estimate the quality and quantity of the DNA, amplify DNA fragments with the polymerase chain reaction, design PCR primers and sequence DNA. The student is able to evaluate his results and optimize methods to some degree. The student can write a simple scientific report.

Contents:

Isolation of genomic DNA, amplification of DNA with PCR, primer design, DNA sequencing with the Sanger dideoxy method from a PCR product and from a cloned material. Computer programs needed for DNA-sequence and fragment analysis. Basic elements of a scientific report.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

48 h exercises including demonstrations, 85 h independent work including homework and reports.

Target group:

ECOGEN compulsory.

Prerequisites and co-requisites:

Concepts of genetics (757110P) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Reports.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail

Person responsible:

Doc. Helmi Kuittinen.

Working life cooperation:

No.

Other information:

-

H750650: EcoGen optional advanced level studies in Genetics major, 5 - 80 op

Voimassaolo: 01.08.2016 -

Opiskelumuoto: Advanced Studies

Laji: Study module

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

Choose from

750653S: Special seminar in biology, 2 - 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

755616S Seminars on special topics in zoology 2.0 op

753613S Special seminar in genetics 4.0 op

752695S Seminar on special topics in botany 2.0 op

753630S Genetics research seminar 2.0 op

754618S Research seminar in fish ecology 2.0 op

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

2-5 ECTS credits / 53-133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc., or Ph.D. degree. Arranged if resources allow.

Learning outcomes:

Students will be acquainted to current issues in biology.

Contents:

Seminars on current issues in biology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Course specific.

Target group:

Biology students.

Prerequisites and co-requisites:

Varying.

Recommended optional programme components:

-

Recommended or required reading:

Varying.

Assessment methods and criteria:

Course specific.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail or Pass / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen and docents.

Working life cooperation:

No.

Other information:

750654S: Special lecture in biology, 2 - 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

752667S Special topics in plant ecology 2.0 op

751690S Lectures on special topics in zoology 2.0 op

ECTS Credits:

2-5 ECTS credits / 53-133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. or Ph.D. degree. Arranged if resources allow

Learning outcomes:

Students will be acquainted to current issues in biology.

Contents:

Seminars on current issues in biology.

Mode of delivery:

Varying.

Learning activities and teaching methods:

Varying.

Target group:

Biology students.

Prerequisites and co-requisites:

Varying.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Varying.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail or Pass / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen ja dosentit.

Working life cooperation:

No.

Other information:

-

750615S: Practical training, 10 - 15 op

Opiskelumuoto: Advanced Studies

Laji: Practical training

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

10-15 ECTS credits / 380-570 hours of traineeship work.

Language of instruction:

Finnish / English.

Timing:

Registration B.Sc. 3rd autumn, training B.Sc. 3rd summer - M.Sc. 1st autumn.

Learning outcomes:

The aim of the course is for students to gain work experience in their own field of biology. Student applies the theoretical knowledge gained during the studies in practice.

Contents:

Minimum training period is two months full day work 10 cr. Students can obtain 15 credits for three months versatile training depending on the length and intensity of it. Student can do the training period in Finland or during her/his exchange period or train otherwise abroad.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

The trainee has to keep a journal of the work and its background factors. This journal and a summary of 6-8 pages have to be handed in to the responsible contact person after the training period. The summary should contain information on the training place, the ongoing research, the trainee's own work and its results. The journal is returned to the student after the summary has been approved. The student has also to be given a reference of the work. Offered training placements are announced in the internet page of Extension School. Entering for the practical training is made in 3rd autumn. Normally, the student has to find him/herself a placement in public or private sectors or abroad.

Target group:

Compulsory to BS and ECO in the M.Sc. degree.

Prerequisites and co-requisites:

About 80 credit amount of biology courses.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Journal and final report.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Contact person Minna Vanhatalo. The supervisors of the practical training are Prof. Markku Orell (ECOz), Prof. Juha Tuomi (ECOb), Prof. Hely Häggman (BSb), M.Sc. Henriikka Honkanen (BSz) and Prof. Outi Savolainen (BSg).

Working life cooperation:

Yes. Participating to biology project gives working life skills.

Other information:

The student has to contact the professor and discuss about the suitability of the internship place in beforehand.

750613S: Research training, 2 - 15 op

Opiskelumuoto: Advanced Studies

Laji: Practical training

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

1-14 ECTS credits / 27-405 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. degree.

Learning outcomes:

Student applies the education given knowledge and skills in working life to gain hands-on experience.

Contents:

Work on special projects in the different biology research groups at the department or elsewhere or independent project work including field and/or laboratory work or work at the biological stations. The work is not included to other study modules in biology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

The topic and the study plan have to be agreed on in advance (registration form). The student has to keep diary and prepare a report on the work.

Target group:

-

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Report.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

Yes. Participating to biology project gives working life skills.

Other information:

-

750661S: Research group seminar, 2 - 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

2-4 ECTS credits / 53-107 hours of work.

Language of instruction:

Finnish / English.

Timing:

Autumn-spring.

Learning outcomes:

Students concern themselves to special features of biological research.

Contents:

Workshop type seminars in different fields of biology help by research groups. Advanced or postgraduate studies. 2 cr. per different seminar series.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

26 h seminars / workshops.

Target group:

M.Sc. or Ph.D. degree.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Active participation to seminars.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

750618S: Thursday seminar in biology, 2 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kuittinen, Helmi Helena

Opintokohteen kielet: English

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

2 ECTS credits / 53 hours of work.

Language of instruction:

English.

Timing:

M.Sc. or Ph.D. degree.

Learning outcomes:

Students get knowledge about the current results and theories in biology.

Contents:

Lectures in English on current topics in biology given by guest lecturers from Finland and abroad.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Guest lectures on Thursdays 12 am-1 pm. See seminar programme: <https://noppa oulu.fi/noppa/kurssi/750618s/etusivu>

Target group:

Undergraduate and postgraduate students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

10 participations and 10 one page long reports. You can combine lectures from different academic terms to make the needed 10 essays.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Doc. Helmi Kuittinen.

Working life cooperation:

No.

Other information:

-

750629S: Kaamos symposium, 2 - 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Muotka, Timo Tapani

Opintokohteen kielet: English

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

2-4 ECTS credits / 53-107 hours of work.

Language of instruction:

English.

Timing:

M.Sc. and Ph.D. autumn.

Learning outcomes:

Students get acquainted to preparing, presenting and evaluating a scientific oral presentation.

Contents:

The Kaamos Symposium consisting of presenting current research projects is held every year at the end of autumn period. Through presenting their research work and projects and obtaining feedback from the audience (students and the staff of the department) post graduate students gain experience in holding a scientific presentation.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Own presentation and the whole symposium 4 cr (postgraduate students). Summary of five presentations and symposium 2 cr (undergraduate students). Poster 2 cr (postgraduate students).

Target group:

Undergraduate biology students (2 cr) and postgraduate biology students (2-4 cr).

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Abstract book.

Assessment methods and criteria:

Presentation or reports.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Prof. Timo Muotka.

Working life cooperation:

No.

Other information:

-

750649S: Examinations on optional topics in biology, 2 - 10 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

751654S	Examination on optional topics	2.0 op
752652S	Examinations on optional topics	2.0 op
753651S	Examinations on optional topics	2.0 op

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

2-10 ECTS credits / 53-267 hours of work.

Language of instruction:

Depending on the book.

Timing:

B.Sc. degree 2.-3. year or M.Sc. degree 1.-2. year.

Learning outcomes:

Student independently concerns him/herself to special issues in biology.

Contents:

Examinations on books, which are not compulsory in any other course unit.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Book exam in Examinarium.

Target group:

-

Prerequisites and co-requisites:

-

Recommended optional programme components:

-

Recommended or required reading:

Literature chosen in agreement with the responsible person.

Assessment methods and criteria:

Book exam in Examinarium.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

757614S: Basics of bioinformatics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Lumi Viljakainen

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

ECOGEN 1st autumn.

Learning outcomes:

After the course the student can explain and is able to use the basic methods for handling nucleotide and protein sequences. Student learns how to use various databases, can explain the background and principles of the analytic methods, is able to take up a critical attitude towards the used methods and gets a good background for applying new methods that are developed continuously.

Contents:

Searching DNA and protein sequences and information connected to the sequences from various databases, genome structure and sequence-based gene prediction and annotation, sequence alignment, introduction to next-generation sequencing techniques.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

12 h lectures, 2 h seminar, 20 h exercises, independent work.

Target group:

ECOGEN BS compulsory.

Prerequisites and co-requisites:

Concepts of genetics (757109P) or equivalent knowledge, also Molecular evolution (757312A) or equivalent knowledge is recommended.

Recommended optional programme components:

-

Recommended or required reading:

Pevsner, J. 2015: Bioinformatics and functional genomics, Wiley-Blackwell.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Take-home exam, exercises, seminar presentation, independent work and student activity.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Lumi Viljakainen.

Working life cooperation:

No.

Other information:

-

757619S: Advanced course in bioinformatics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Phillip Watts

Opintokohteen kielet: Finnish

Leikkaavuudet:

753629S Advanced course in bioinformatics 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

English.

Timing:

M.Sc. 2nd spring.

Learning outcomes:

The main objective of this course is to provide students with understanding and experience of the main techniques required to manipulate, analyse and interpret next generation sequence data. Students will understand different technologies; be capable of manipulating data files and assess data quality; assemble and map reads; identify genes and variants; complete some basic analyses of genome data.

Contents:

During the course, students will manipulate an example data set to provide a comprehensive experience of contemporary bioinformatics techniques required to identify genes and polymorphisms, as well as familiarity with the command terminal and basic LINUX commands. This course builds on Basics of bioinformatics (757314A) and complements the theory learnt in Introduction to population genetics (757313A), Introduction to molecular ecology (756650S) and Experimental course in evolutionary genomics (757621S). Lectures provide the core understanding of the main steps and principals behind data analyses, but the core content will be practical experience of handling and analysing large data sets.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Contact hours: 12 hrs lectures, 40 hrs computer exercises, 56 hr independent study. Continuous assessment (coursework) and a final exam.

Target group:

Bioscience and Ecology M.Sc.

Prerequisites and co-requisites:

Basics of bioinformatics (757314A) or equivalent knowledge, Introduction to population genetics (757313A), Molecular evolution (757312A).

Recommended optional programme components:

-

Recommended or required reading:

Good guide for much of this is the De Wit P. et al 2012: The simple fool's guide to population genomics via RNA-Seq: an introduction to high-throughput sequencing data analysis. Molecular Ecology Resources. Molecular Ecology Resources. Volume 12, Issue 6, pages 1058–1067, November 2012 and other course material.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Continuous assessment, learning diary and project report.

Grading:

1-5 / Fail.

Person responsible:

Dr. Phillip Watts.

Working life cooperation:

No.

Other information:

-

757621S: Experimental course in evolutionary genomics, 5 op

Voimassaolo: 01.08.2015 - 31.07.2020

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Phillip Watts

Opintokohteen kielet: Finnish

Leikkaavuudet:

753624S Experimental course in evolutionary genomics 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

English.

Timing:

M.Sc. 2nd spring.

Learning outcomes:

After the course the student will be able to analyze DNA sequence differences between species, applying the knowledge obtained during courses in bioinformatics and molecular evolution. The student will know how to retrieve information from public sequence databases, characterize sequences, estimate nucleotide substitutions, align sequences, build phylogenetic trees and estimate their confidence. The student will be capable of making a hypothesis related to molecular evolution and test it using sequence data.

Contents:

Sequence databases, methods and computer programs for handling and analysing sequences obtained from databases. Research appropriate scientific literature. Work is done mainly in the computer classroom.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

48 hr exercises including demonstrations and seminar, independent work including reports.

Target group:

BSg students.

Prerequisites and co-requisites:

Advanced course in bioinformatics (757619S) and Molecular evolution (757312A) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Reports, independent work and seminar.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Dr. Phillip Watts.

Working life cooperation:

No.

Other information:

-

757620S: Methods in genomics and genomics evolution, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Savolainen Outi

Opintokohteen kielet: Finnish

Leikkaavuudet:

753612S Methods in genomics and genomics evolution 6.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. 1st autumn.

Learning outcomes:

Student knows focal features of genome structure, evolution and research methods.

Contents:

Genome structure, composition, comparative genomics, recombination and evolutionary factors affecting genome composition. Theory and methods.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

24 h lectures, 24 h seminars, independent work 83 h, exam, reports.

Target group:

BSg.

Prerequisites and co-requisites:

Concepts of genetics 5 cr (757109P), Experimental course in general genetics 5 cr (757110P) and Basics in population genetics 5 cr (757313A).

Recommended optional programme components:

-

Recommended or required reading:

Recent review articles.

Assessment methods and criteria:

Reports and exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

300002M: Advanced Information Skills, 1 op

Voimassaolo: 01.08.2009 -

Opiskelumuoto: Other Studies

Laji: Course

Vastuuyksikkö: Faculty of Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Ursula Heinikoski

Opintokohteen kielet: Finnish

ECTS Credits:

1 ECTS credit

Language of instruction:

Finnish

Timing:

Intended for degree students working on their diploma/master's thesis. The course unit is held once in the autumn and once in the spring semester.

Learning outcomes:

Students know the different phases of scientific information retrieval process and basic techniques of systematic information search. They will find the most important reference databases of their discipline and know how to evaluate information sources and search results.

Contents:

Scientific information retrieval, evaluation of search results and information sources, information search on subject areas of diploma/master's thesis.

Mode of delivery:

Blended teaching

Learning activities and teaching methods:

Lectures 10 h, self-study 17 h

Target group:

The course is optional for students of Science and Technology.

Recommended or required reading:

Web learning material:

<http://libguides oulu.fi/tieteellinentiedonhankinta>

<http://libguides oulu.fi/julkaisujenarviointi>

Assessment methods and criteria:

Passing the course requires participation in the lectures and successful completion of the course assignments.

Grading:

pass/fail

Person responsible:

Library information specialists, informationservice(at)oulu.fi

030008P: Information Skills for foreign degree students, 1 op

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Technology

Arvostelu: 1 - 5, pass, fail

Opettajat: Ursula Heinikoski, Sassali, Jani Henrik

Opintokohteen kielet: English

ECTS Credits:

1 ECTS credit

Language of instruction:

English

Timing:

The course unit is held in the autumn and spring semester.

Learning outcomes:

Students know the different phases of scientific information retrieval process and basic techniques of systematic information search. They will find the most important reference databases of their discipline and know how to evaluate information sources and search results.

Contents:

Retrieval of scientific information, the search process, key databases of the discipline, and evaluation of information retrieval and information sources.

Mode of delivery:

Blended teaching: classroom training, web-based learning material and exercises in Optima environment, a final assignment on a topic of the student's own choice

Learning activities and teaching methods:

Training sessions 8h, self-study 19h

Target group:

The course is aimed at degree students of science and technology. The course is compulsory for the Master's Degree Programme (BCBU) in Environmental Engineering (BEE).

Prerequisites and co-requisites:

It is recommended that the student knows the basic services of Oulu University Library. The student can participate in the Library ABC -training (<http://www oulu.fi/library/libraryabc>).

Recommended optional programme components:

-

Recommended or required reading:

Web learning material: <http://libguides oulu.fi/findinginformation>

Assessment methods and criteria:

Passing the course requires participation in the training sessions and successful completion of the course assignments.

Grading:

pass/fail

Person responsible:

Library information specialists, [informationservice\(at\)oulu.fi](mailto:informationservice(at)oulu.fi)

Working life cooperation:

-

Other information:

-

Tutkintorakenteisiin kuulumattomien opintokokonaisuuksien ja -jaksojen kuvaukset

750376A-01: Bachelor of Science seminar and thesis, scientific writing, 0 op

Voimassaolo: 01.08.2015 - 31.07.2017

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

750396A-01 Bachelor of Science seminar, scientific review 0.0 op

Ei opintojaksokuvauksia.

750376A-03: Bachelor of Science seminar and thesis, thesis, 0 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

750376A-02: Bachelor of Science seminar and thesis, workshop, 0 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

750396A-02 Bachelor of Science seminar, presentation and scientific communication. 0.0 op

Ei opintojaksokuvauksia.

755631S: Biodiversity in human changed environments, 5 op

Voimassaolo: 01.08.2015 - 31.07.2019

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Orell, Markku Ilmari, Jouni Aspi, Muotka, Timo Tapani

Opintokohteen kielet: Finnish

Leikkaavuudet:

750635S Biodiversity in human changed environments 3.0 op

ECTS Credits:

5 cr / 133 hours of work.

Language of instruction:

Finnish.

Timing:

M.Sc. 1st or 2nd autumn. Arranged if resources allow.

Learning outcomes:

Student gets a wide view on basic concepts in conservation biology, why and how biodiversity can be maintained, present situation of biodiversity worldwide, threats and conservation needs of biodiversity.

Contents:

The course consists of three parts: 1. Introduction, which initiates students into main concepts and the present situation of biodiversity worldwide. 2. Populations, communities, and ecosystems in human changed environments. Themes e.g. extinctions, conservation areas and their management, biodiversity and functioning of ecosystems, invasive species issues, extinction and fragmentation of natural habitats. 3. Genetics. Modern theory and practice of genetic conservation especially the usage of molecular genetic methods in determining the population structure.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

34 h lectures and practicals, internet work and exam.

Target group:

Advanced course for ecology and genetics students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Primack, R.B. 2010: Essentials of conservation biology (5. e). Sinauer Associates, Inc , Muu kirjallisuus: Gaston, K.J. & Spicer, J.I. 2004. Biodiversity. An introduction, 2. e. Blackwell. 191 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Lecture exam 2 cr and book exam (Primack) 3 cr.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Lecture exam: 1-5 / Fail and Book exam 1-5 / Fail.

Person responsible:

Prof. Markku Orell, Prof. Timo Muotka ja Prof. Jouni Aspi.

Working life cooperation:

No.

Other information:

-

750373A-01: Biogeography, animals, 0 op

Voimassaolo: 01.08.2015 - 31.07.2019

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kvist, Laura Irmeli

Opintokohteen kielet: Finnish

Leikkaavuudet:

750363A-02 Biogeography, Zoology 0.0 op

Ei opintojaksokuvauksia.

750373A-02: Biogeography, plants, 0 op

Voimassaolo: 01.08.2015 - 31.07.2019

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Jari-Heikki Oksanen

Opintokohteen kielet: Finnish

Leikkaavuudet:

750363A-01 Biogeography, Botany 0.0 op

Ei opintojaksokuvauksia.

752362A: Botanical collection, 2 - 6 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Anna Ruotsalainen

Opintokohteen kielet: Finnish

ECTS Credits:

2-6 ECTS credits / 53-160 hours of work, 100 species = 2 cr.

Language of instruction:

Finnish / English.

Timing:

B.Sc. or M.Sc. degree.

Learning outcomes:

Preparation (including labels and coordinates) and identification of self-collected botanical specimen.

Contents:

The collection may contain solely vascular plants or together with moss and lichen specimens, for instance.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Vascular plants have to be pressed and dried. The samples have to be in folded paper or small box including the name and place tag. Before starting the collection work student has to consult the teacher. 100 plant species correspond to 2 credits.

Target group:

-

Prerequisites and co-requisites:

Identification of plant species (756342A) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Hämet-Ahti et al. 1998: Retkeilykasvio (Field Flora of Finland), Ed. 4. Finnish Museum of Natural History, Helsinki. 656 pp., and other field floras.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Collection is delivered to the person in responsible.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Doc. Anna Liisa Ruotsalainen.

Working life cooperation:

No.

Other information:

Contact the responsible teacher on details.

750121P-02: Cell biology, Botany, 0 op

Voimassaolo: - 31.07.2020

Opiskelumuoto: Basic Studies

Laji: Partial credit

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Häggman, Hely Margaretha

Opintoalueen kielet: Finnish

Ei opintojaksokuvauksia.

750121P-03: Cell biology, Genetics, 0 op

Voimassaolo: - 31.07.2020

Opiskelumuoto: Basic Studies

Laji: Partial credit

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kuittinen, Helmi Helena

Opintoalueen kielet: Finnish

Ei opintojaksokuvauksia.

750121P-01: Cell biology, Zoology, 0 op

Voimassaolo: - 31.07.2020

Opiskelumuoto: Basic Studies

Laji: Partial credit

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Jaana Jurvansuu

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

757122P: Concepts of genetics for biochemists, 3 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Savolainen Outi

Opintokohteen kielet: Finnish

Leikkaavuudet:

757109P Concepts of genetics 5.0 op

ECTS Credits:

3 ECTS cr / 81 hours of work.

Language of instruction:

Finnish.

Timing:

According to biochemistry students schedule.

Learning outcomes:

To understand and apply basic concepts of genetics, at Mendelian and molecular level.

Contents:

Part 1. Mendelian genetics, including the ideas of quantitative and population genetics and Part 3. Selected topics on developmental genetics, and genetics of health and diseases.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Part 1. and 3. lectures and seminar, independent studying and exams.

Target group:

Biochemistry students: parts 1 and 3 (3 cr) compulsory.

Prerequisites and co-requisites:

Cell biology (750121P) or equivalent knowledge.

Recommended optional programme components:

This course is prerequisite to all other genetics courses.

Recommended or required reading:

Materials are in Optima. Klug et al. 2012. Concepts of Genetics (10. ed). Pearson, 896 p. Alberts, B. et al. 2008:

Molecular Biology of the Cell (5. ed). Garland Science Publishing, London, 1268 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Essays, home exam, lecture diary and exams.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

756347A: Conservation of biodiversity, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Phillip Watts

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay756347A Conservation of biodiversity (OPEN UNI) 5.0 op

752321A Conservation of Biodiversity 3.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

English.

Timing:

B.Sc. 3 rd autumn. NNE.

Learning outcomes:

Students know the central concepts of biodiversity, threats to biodiversity, and methods of conservation of biodiversity.

Contents:

Biodiversity and its components. Major theories of the ecological control of biodiversity. Habitat fragmentation and habitat destruction and their consequences. Metapopulation theory and networks of nature reserves. Current issues in the conservation of biodiversity.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

14 h lectures, literature, exam.

Target group:

Biology students. Students who are participating in environmental conservation or tourism minor.

Prerequisites and co-requisites:

No

Recommended optional programme components:

-

Recommended or required reading:

Hanski I. 2005: The Shrinking World. International Ecology Institute, Oldendorf/Luhe, Germany. The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Dr. Phillip Watts.

Working life cooperation:

No.

Other information:

-

755320A-01: Developmental biology-histology, Developmental biology lectures, 0 op

Voimassaolo: 01.08.2015 - 31.12.2019

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

751367A-01 Developmental biology-histology, Developmental biology lectures 0.0 op

Ei opintojaksokuvauksia.

755317A: Developmental biology-histology, exercises, 5 op

Voimassaolo: 01.08.2011 - 31.07.2019

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B. Sc. 1st spring.

Learning outcomes:

After completing the developmental biology -part of the course the student is able to name the most important events of embryonic development and the structural changes related to them. The student is also able to describe the principles gene regulation related to embryonic development. After completing the histology-part of the course the student is able to describe the various tissue types and the microscopic structure of important organs and is also able to identify tissue types and organs from microscopic sections.

Contents:

Motto: "It is not birth, marriage, or death, but gastrulation, which is truly the most important time in your life." (Lewis Wolpert, 1986). Developmental biology will cover gametogenesis, fertilization, forming of embryonic tissue layers (gastrulation), embryonic induction, signal molecules and the differentiation of the most important tissues and organs (organogenesis). Histology will first cover various tissue types, their cell types and matrix composition. Thereafter, the microscopic structure and tissue composition of various organs and organ systems will be covered. In both parts, practical exercises on drawing from microscopic slides (see 755317A) will support lectures.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

44 h exercises, microscopic studying and drawing from the preparates.

Target group:

BS: compulsory, TEAbs optional.

Prerequisites and co-requisites:

Cell biology (750121P) or equivalent knowledge.

Recommended optional programme components:

Same time with Developmental biology-histology lectures (751367A).

Recommended or required reading:

Handout.

Assessment methods and criteria:

Exercise exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

N.N.

Working life cooperation:

No.

Other information:

755320A-02: Developmental biology-histology, histology lectures, 0 op

Voimassaolo: 01.08.2015 - 31.12.2019

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

751367A-02 Developmental biology-Histology, Histology lectures 0.0 op

Ei opintojaksokuvauksia.

752175P: Environmental ecology, 5 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Taulavuori

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay752175P Environmental ecology (OPEN UNI) 5.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

Spring, (arranged if resources allow).

Learning outcomes:

After finishing the course student understands the ecological background of most important environmental questions and has knowledge to apply this to decision making in environmental problems.

Contents:

Ecological basics of nature conservation. Effects of physical and chemical environment on living organisms, basics of population ecology, communities and ecosystems. Environmental changes and how species can adapt to them. World wide environmental problems and actions to solve them are studied within the course. Special environmental questions in Finland and in Europe.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Book exam and written report according to agreement with teacher.

Target group:

-

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Raven et al. 2012: Environment. Wiley & Sons, 516 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Report and final exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Kari Taulavuori.

Working life cooperation:

No.

Other information:

Arranged if resources allow

750149P: Examinations on optional topics in biology, 2 - 10 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

2-10 ECTS credits / 53-267 hours of work.

Language of instruction:

Depends on the book.

Timing:

B.Sc. degree 2.-3. year or M.Sc. degree 1.-2. year.

Learning outcomes:

Student independently concerns him/herself to special issues in biology.

Contents:

Examinations on books, which are not compulsory in any other course unit.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Book exam in Examinarium.

Target group:

-

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Literature chosen in agreement with the responsible person.

Assessment methods and criteria:

Book exam in Examinarium.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail or Pass / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Outi Savolainen, Prof. Jari Oksanen, Prof. Markku Orell.

Working life cooperation:

No.

Other information:

-

752342A: Field course in arctic-alpine ecology and vegetation, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Virtanen, Risto Juhani

Opintokohteen kielet: Finnish

ECTS Credits:

4 ECTS credits / 107 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 2 nd or 3 rd autumn. M.Sc. 1 st or 2 nd autumn. Every second year at the Kilpisjärvi biological station.

Arranged if resources allow.

Learning outcomes:

By passing this course a student is able to identify plant and animal species, nature types, vegetation of NW Fennoscandian mountain areas, understand ecology of northern ecosystems, ecological interactions and adaptation. Advanced training in experimental and observational field research.

Contents:

Arctic-alpine ecosystems as one the main biomes of the world. Plant and animal species of arctic-alpine areas. Vegetation and ecology of NW Fennoscandian mountain areas. Plant-herbivore interactions in tundra ecosystems.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Field course.

Target group:

Ecology students.

Prerequisites and co-requisites:

Field course in ecological botany (756343A) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Disseminated during course, internet resources. Literature on arctic-alpine ecosystems.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Field course, field exercise. Planning of the study, field work and analyzing data. Making a report with reference to scientific literature. Oral presentation of the study (Power Point).

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Field exam including questions about the species and northern arctic-alpine nature.

Pass / Fail.

Person responsible:

Doc. Risto Virtanen.

Working life cooperation:

No.

Other information:

Arranged with cooperation of the University of Eastern Finland.

754623S: Final examination in hydrobiology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Muotka, Timo Tapani

Opintokohteen kielet: Finnish

Leikkaavuudet:

754612S Final examination in hydrobiology 7.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

English.

Timing:

M.Sc. 1st or 2nd year.

Learning outcomes:

The student will understand profoundly certain hydrobiology's methods, results and theories.

Contents:

The examination is compulsory to the students taking the hydrobiology study package. Reading material selected in agreement with the teacher in charge.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Book exam.

Target group:

-

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Exam books agreed with the teacher.

Assessment methods and criteria:

Final exam in Examinarium.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Timo Muotka.

Working life cooperation:

No.

Other information:

-

757315A: Human genetics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Tanja Pyhäjärvi

Opintokohteen kielet: Finnish

Leikkaavuudet:

753307A Human genetics 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. or M.Sc. degree. Arranged if resources allow.

Learning outcomes:

To understand human evolution and man as a biological species.

Contents:

Human evolution in Africa, spread of different human species to other continents, research methods including population genetics and genomics, molecular human genetics: inherited diseases and susceptibilities.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures, home works.

Target group:

Arranged every second autumn. Course necessary for students of genetics, not compulsory. Suitable also for biochemistry students and education students.

Prerequisites and co-requisites:

Concepts of genetics (757109P) or equivalent knowledge.

Recommended optional programme components:

Educational, voluntary.

Recommended or required reading:

Jobling et al. 2014: Human evolutionary genetics. 2nd ed. Garland Science, ISBN 9780815341482.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Learning diary, controlled exam and student activity.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Dr. Tanja Pyhäjärvi

Working life cooperation:

No.

Other information:

-

751673S: Identification of animals, 5 op

Voimassaolo: 01.08.2011 - 31.07.2016

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Koivula

Opintokohteen kielet: English

ECTS Credits:

6 ECTS credits / 162 hours of work.

Language of instruction:

English.

Timing:

ECOGEN ECOz 1st autumn and spring.

Learning outcomes:

Main point of the course is to learn to identify Finnish animal species (vertebrate) and families (invertebrate) from museum samples. Basics of species' ecology and classification of organisms.

Contents:

During the autumn semester (6 h lectures, 16 h exercises, exam), the Finnish vertebrate fauna is studied using stuffed museum samples. In the spring semester (6 h lectures, 16 h exercises, exam) the invertebrate taxons (mostly family- or genus-level) common in Finland are studied using museum samples.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

12 h lectures, 32 h exercises, independent studying, 2 exams.

Target group:

ECOGEN.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

This course is needed for attending courses Field course in terrestrial animals (755322A) and Field course in aquatic animals (755321A).

Recommended or required reading:

Course handouts, Itämies J. ja Viro P. 1995: Eläinten lajintuntemus, selkärangattomat, 73 p.; Putaala, A., Marjakangas, A. & Rytönen, S. 2001: Eläinten lajintuntemus, selkärangaiset, 42 p.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Two species exams.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Kari Koivula.

Working life cooperation:

No.

Other information:

-

756311A: Identification of garden plant species, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Anna Ruotsalainen

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay756311A Identification of garden plant species (OPEN UNI) 5.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 2nd summer.

Learning outcomes:

Capability to identify garden and crop species. Emphasising species thriving in northern conditions.

Contents:

Independent study of approximately 400 species in the Botanical Gardens with the help of a handout.

Mode of delivery:

Face-to-face teaching. Self-learning in the collections (species list is given, explanations in Finnish only).

Learning activities and teaching methods:

Independent studying in the garden. Botanical Gardens personnel will help finding the species on demand.

Target group:

ECOb, BSb and TEA.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

Course generally promotes studies in species identification and biodiversity.

Recommended or required reading:

Hiltunen, R. & Hyvärinen, M. 2009: Puutarhakasvien lajintuntemus. Biologian laitoksen monisteita, Yliopistopaino, Oulu.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Final exam in August or beginning of September in the Botanical Gardens.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

doc. Anna Liisa Ruotsalainen.

Working life cooperation:

No.

Other information:

Contact the responsible teacher on details.

756650S-02: Introduction to molecular ecology, exercises, 0 op

Voimassaolo: 01.08.2015 - 31.07.2019

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Ei opintojaksokuvauksia.

756650S-01: Introduction to molecular ecology, lectures, 0 op

Voimassaolo: 01.08.2015 - 31.07.2019

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Ei opintojaksokuvauksia.

750329A: Kaamos-symposium, 2 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Muotka, Timo Tapani

Opintokohteen kielet: English

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

2 ECTS credits / 53 hours of work.

Language of instruction:

English.

Timing:

B.Sc., M.Sc., autumn.

Learning outcomes:

Undergraduate students get acquainted to listening and evaluating scientific oral presentations.

Contents:

Keynote speakers and Ph.D. students seminar presentations in The Kaamos Symposium.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Own presentation and the whole symposium 4 cr (postgraduate students), Organizing the symposium 3 cr (postgraduate students), poster 2 cr (postgraduate students), summary of five presentations and symposium 2 cr (undergraduate students).

Target group:

Undergraduate and postgraduate biology students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Abstract book.

Assessment methods and criteria:

Reports.

Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

Pass / Fail.

Person responsible:

Prof. Timo Muotka.

Working life cooperation:

No.

Other information:

-

750316A: Legislation in environmental protection, 5 op**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Field of Biology**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Kari Taulavuori**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

ay750316A Legislation in environmental protection (OPEN UNI) 5.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 2nd or 3rd autumn or M.Sc. 1 st autumn. Arranged if resources allow.

Learning outcomes:

To familiarise students with environmental legislation in European Union with regard to environmental protection and natural resources. Student is able to apply his knowledge to different environmental questions and analyze the needed means. Student knows the environmental administration and organisations in environmental protection and natural resources.

Contents:

Environmental protection and natural resources legislation in Finland and in Europe. Environmental administration and organisations, use and protection of natural resources, prevention of environmental destruction, assessment of environmental effect as well as principles of environmental legislation and main international conventions, environmental issues in UNEP and OECD are covered.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

24 h lectures, 18 h exercises including demonstrations and literature.

Target group:

Compulsory to students who are doing the environmental protection 25 cr. study module.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

Compulsory to students who are doing the environmental protection 25 cr. study module.

Recommended or required reading:

Erkki J. Hollo 2001: Ympäristönsuojeluoikeus, WSOY, 592 s, Kokkonen, Tuomas (toim.): Ympäristölainsäädäntö 2011. 1269 s Talentum.

The availability of the literature can be checked from [this link](#).**Assessment methods and criteria:**

Exam or learning diary.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Kari Taulavuori.

Working life cooperation:

No.

Other information:

Also the environmental legislation course that Faculty of technology arranges is accepted.

752316A: Macro fungi, 3 op**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Field of Biology**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Annamari Markkola**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

ay752316A Macro fungi (OPEN UNI) 3.0 op

ECTS Credits:

3 ECTS credits / 80 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 3 rd autumn. NNE.

Learning outcomes:

Student is able to identify most common macrofungal species as fresh specimens and knows basics of fungal ecology.

Contents:

Demonstrations of macrofungi in the field, basics of identification, ecology and distribution.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

14 h lectures, 25 h exercises including excursions, identification exam.

Target group:

Optional.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Course handout, Salo, P. and Nummela-Salo, U. 2002: Sienikurssi (752316). Toinen uusittu painos. Lajiesittelyt. Biologian laitoksen monisteita 2/2002, 41 p. and mushroom guides.

The availability of the literature can be checked from [this link](#).**Assessment methods and criteria:**

Species identification exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

1-5 / Fail.

Person responsible:

Doc. Annamari Markkola.

Working life cooperation:

No.

Other information:

-

750179P: Minor subject examination in biology, 5 op

Voimassaolo: 01.08.2015 - 31.07.2017

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Muotka, Timo Tapani

Opintokohteen kielet: Finnish

Leikkaavuudet:

750160P Minor subject examination in biology 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Book in English.

Timing:

B.Sc. / M.Sc.

Learning outcomes:

The book exam gives to the non-biology student basics in biology so that he/she can follow the hydrobiology courses arranged by the biology degree programme.

Contents:

Basics in biology.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Book exam.

Target group:

A book exam compulsory to non-biology students who do the hydrobiology study package.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

A compulsory book exam to non-biology students taking the hydrobiology study package.

Recommended or required reading:

Reece, J.B. Urry, L.A. Cain, M.L., Wasserman, S.A. Minorsky, P.V. & Jackson R.B. 2011: Campbell Biology (9th ed). Pearson, Global Edition, 1309 p. The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Book exam. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Prof. Timo Muotka.

Working life cooperation:

No.

Other information:

-

752392A: Mire ecology, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Virtanen, Risto Juhani

Opintokohteen kielet: Finnish

ECTS Credits:

4 ECTS credits / 107 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 2 nd or 3 rd autumn. M.Sc. 1 st or 2 nd autumn. Every second year at the Oulanka research station.
Arranged if resources allow.

Learning outcomes:

By passing this course a student is able to identify plant species (bryophytes and vascular plants), mire types, vegetation of boreal areas, species indicator values, determine mire types, interpret ecology of mire systems and make inventories on mire landscapes.

Contents:

Plant species (bryophytes and vascular plants), mire types, vegetation of boreal areas. Regional patterns in mire vegetation, mire types and underlying ecological gradients. Mire hydrotopography and peat stratigraphy. Red list status of mire vegetation.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures 9 h, field course and field exercises 47 h.

Target group:

Plant ecology students.

Prerequisites and co-requisites:

Field course in ecological botany (756343A).

Recommended optional programme components:

-

Recommended or required reading:

Eurola, S., Huttunen, A. & Kukko-oja, K. 1995: Suokasvillisuusopas. Oulanka Reports 14: 1-85 ja Eurola, S., Bendiksen, K. & Rönkä, A. 1990: Suokasviopas. Oulanka Reports 9: 1-205.

The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Lectures, field exercises, team work in small groups.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Mire types and species exam. 1-5 / Fail.

Person responsible:

Doc. Risto Virtanen.

Working life cooperation:

No.

Other information:

Organised together with the University of Eastern Finland.

750399A: Optional examinations in environmental protection, 2 - 6 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Taulavuori

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

2-6 ECTS credits / 53-160 hours of work. About 100 pages / 1 ECTS credit.

Language of instruction:

Most books are in English.

Timing:

B.Sc. or M.Sc. degree.

Learning outcomes:

To understand environmental protection in global context.

Contents:

Depends on the book.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Three times per both semesters in university exam days. Exam days are announced in WebOodi.

Target group:

Biology, geography, geology, environmental engineering , exchange students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Gaston & Spicer (2004) Biodiversity – an introduction. Blackwell Publishing, 191p; Lockwood et al. (2007) Invasion Ecology, Blackwell Publishing, 304 p; ACIA (2005) Arctic Climate Impact Assessment, Cambridge University Press, 1042 p.; Dincer et al. (2013) Causes, Impacts and Solutions to Global Warming, Springer, 1183 p.

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Doc. Kari Taulavuori.

Working life cooperation:

No.

Other information:

Student has to consult about the selected literature before exam.

750199P: Optional examinations in environmental protection, 2 - 6 op

Voimassaolo: - 31.12.2018

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Taulavuori

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay750199P Optional examinations in environmental protection (OPEN UNI) 2.0 op

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

2-6 ECTS credits / 53-160 hours of work. About 100 pages / 1 ECTS credit.

Language of instruction:

Most books are in English.

Timing:

B.Sc. or M.Sc. degree.

Learning outcomes:

To understand environmental protection in global context.

Contents:

Depends on the book.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Three times per both semesters in university exam days. Exam days are announced in WebOodi.

Target group:

Biology, geography, geology, environmental engineering , exchange students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Gaston & Spicer (2004) Biodiversity – an introduction. Blackwell Publishing, 191p; Lockwood et al. (2007) Invasion Ecology, Blackwell Publishing, 304 p; ACIA (2005) Arctic Climate Impact Assessment, Cambridge University Press, 1042 p.; Dincer et al. (2013) Causes, Impacts and Solutions to Global Warming, Springer, 1183 p.

Assessment methods and criteria:

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail.

Person responsible:

Dr. Kari Taulavuori.

Working life cooperation:

No.

Other information:

Student has to consult about the selected literature before exam.

756622S: Structure and dynamics of plant communities, 5 op

Voimassaolo: - 31.07.2017

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Jari-Heikki Oksanen

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. degree, (arranged if resources allow).

Learning outcomes:

The student knows the most important processes controlling the structure and dynamics of plant communities, and the major theories concerning those processes. The students can apply theories in the research of plant communities.

Contents:

Models on structure of communities, in particular the neutral models, and assembly rules. The estimation of biological diversity. The relationship between species and their environment, and its consequences: the analysis of ecological communities and bioindication. The course follows the scientific development, and its contents will be adjusted for the current scientific literature, and the exact contents will vary among years.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

24 h lectures, essay.

Target group:

-

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Current article collection and course handout.

Assessment methods and criteria:

Essay.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

-

Person responsible:

Prof. Jari Oksanen.

Working life cooperation:

No.

Other information:

-

750133P: Studies in biology abroad, 1 - 60 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Leikkaavuudet:

751193P	Foreign studies	0.0 op
752186P	Foreign studies	0.0 op
753193P	Foreign studies	0.0 op

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

-

Language of instruction:

Varying.

Timing:

B.Sc. or M.Sc. degree.

Learning outcomes:

Student will be acquainted to varying issues in biology.

Contents:

Studies done under international exchange programs (ERASMUS, NORDPLUS, ISEP) in foreign universities.

Courses are either credit transferred or substituted.

Mode of delivery:

Varying.

Learning activities and teaching methods:

Varying.

Target group:

Varying.

Prerequisites and co-requisites:

Exchange programme university's prerequisites for the courses.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Credit transfer. Read more about [assessment criteria](#) at the University of Oulu webpage.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail or Pass / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

750333A: Studies in biology abroad, 1 - 60 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Leikkaavuudet:

751393A	Foreign studies	0.0 op
752386A	Foreign studies	0.0 op
753393A	Foreign studies	0.0 op

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

-

Language of instruction:

Varying.

Timing:

B.Sc. or M.Sc. degree.

Learning outcomes:

Student will be acquainted to varying issues in biology.

Contents:

Studies done under international exchange programs (ERASMUS, NORDPLUS, ISEP) in foreign universities.

Courses are either credit transferred or substituted.

Mode of delivery:

Varying.

Learning activities and teaching methods:

Varying.

Target group:

Varying.

Prerequisites and co-requisites:

Exchange programme university's prerequisites for the courses.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Credit transfer. Read more about [assessment criteria](#) at the University of Oulu webpage.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1-5 / Fail or Pass / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

750633S: Studies in biology abroad, 1 - 60 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Leikkaavuudet:

751693S	Foreign studies	0.0 op
752686S	Foreign studies	0.0 op
753693S	Foreign studies	0.0 op

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

-

Language of instruction:

Varying.

Timing:

M.Sc. degree.

Learning outcomes:

Student will be acquainted to varying issues in biology.

Contents:

Studies done under international exchange programs (ERASMUS, NORDPLUS, ISEP) in foreign universities.
Courses are either credit transferred or substituted.

Mode of delivery:

Varying.

Learning activities and teaching methods:

Varying.

Target group:

-

Prerequisites and co-requisites:

Exchange programme university's prerequisites for the courses.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Credit transfer.

Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

1-5 / Fail or Pass / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

750155P: Studies in biology in other Finnish universities, 1 - 60 op**Voimassaolo:** 01.08.2015 -**Opiskelumuoto:** Basic Studies**Laji:** Course**Vastuuyksikkö:** Field of Biology**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

756105P	Studies in botany in other Finnish universities	0.0 op
757105P	Studies in genetics in other Finnish universities	0.0 op
755105P	Studies in zoology in other Finnish universities	0.0 op

Voidaan suorittaa useasti: Kyllä**ECTS Credits:**

-

Language of instruction:

Varying.

Timing:

B.Sc. or M.Sc. degree.

Learning outcomes:

Student will be acquainted to varying issues in biology.

Contents:

Studies done in other Finnish universities credit transferred on agreement.

Mode of delivery:

Varying.

Learning activities and teaching methods:

Varying.

Target group:

Varying.

Prerequisites and co-requisites:

-

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Credit transfer.

Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

1-5 / Fail or Pass / Fail.

Person responsible:

Professors.

Working life cooperation:

No.

Other information:

-

750355A: Studies in biology in other Finnish universities, 1 - 60 op**Voimassaolo:** 01.08.2015 -**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Field of Biology**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

755305A Studies in zoology in other Finnish universities 0.0 op

756305A Studies in botany in other Finnish universities 0.0 op

757305A Studies in genetics in other Finnish universities 0.0 op

Voidaan suorittaa useasti: Kyllä**ECTS Credits:**

-

Language of instruction:

Varying.

Timing:

B.Sc. or M.Sc. degree.

Learning outcomes:

Student will be acquainted to varying issues in biology.

Contents:

Studies done in other Finnish universities credit transferred on agreement.

Mode of delivery:

Varying.

Learning activities and teaching methods:

Varying.

Target group:

Varying.

Prerequisites and co-requisites:

-

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Credit transfer.

Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

1-5 / Fail or Pass / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

-

750655S: Studies in biology in other Finnish universities, 1 - 60 op**Voimassaolo:** 01.08.2015 -**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Field of Biology**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

755605S	Studies in Zoology in other Finnish Universities	0.0 op
756605S	Studies in Botany in other Finnish Universities	0.0 op
757605S	Studies in Genetics in other Finnish Universities	0.0 op

Voidaan suorittaa useasti: Kyllä**ECTS Credits:**

-

Language of instruction:

Varying.

Timing:

B.Sc. or M.Sc. degree.

Learning outcomes:

Varying

Contents:

Studies done in other Finnish universities credit transferred on agreement.

Mode of delivery:

Varying.

Learning activities and teaching methods:

Varying.

Target group:

-

Prerequisites and co-requisites:

-

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Credit transfer.

Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

1-5 / Fail or Pass / Fail.

Person responsible:

Prof. Hely Häggman, Prof. Jari Oksanen, Prof. Markku Orell or Prof. Outi Savolainen.

Working life cooperation:

No.

Other information:

750318A: Thursday seminar in biology, 2 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kuittinen, Helmi Helena

Opintokohteen kielet: English

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

2 ECTS credits / 53 hours of work.

Language of instruction:

English.

Timing:

B.Sc., M.Sc. or Ph.D. degree.

Learning outcomes:

Students get knowledge about the current results and theories in biology.

Contents:

Lectures in English on current topics in biology given by guest lecturers from Finland or abroad.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Guest lectures on Thursdays 12 am-1 pm. See seminar programme: <https://noppa oulu.fi/noppa/kurssi/750616S/etusivu>

Target group:

Undergraduate and postgraduate students interested in biology.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

10 participations and 10 one page long reports. Seminar essays can be done during multiple semesters.

Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass / Fail.

Person responsible:

Doc. Helmi Kuittinen.

Working life cooperation:

No.

Other information:

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