

# Opasraportti

## FSci - Degree programme in Biology (2019 - 2020)

### BIOLOGY DEGREE PROGRAMME

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

MSc degree specialisation is ecology or bioscience. MSc degree (120 ECTS) includes minimum 80 ECTS major studies in Ecology or Genetics. Degree does not include compulsory minor. Instead student can choose 40 ECTS optional advanced major courses, optional minors and single courses which are important for the student's personal study plan.

#### *Specialisation Ecology, Major Ecology 120 ECTS*

Compulsory major studies (80 ECTS): Degree WebOodi

Master of science seminar 750678S 5 ECTS

Final examination in biology 750656S 10 ECTS

Pro gradu thesis in biology 750658S 40 ECTS

Maturity exam 750632S 0 ECTS

Methods in ecology I ( 755325A 5 ECTS

Methods in ecology II 755329A 5 ECTS

Introduction to molecular ecology 756650S 5 ECTS

Population ecology 755336A 10 ECTS

#### *Optional major studies:*

Special seminar in biology 750653S 2-5 ECTS

Special lecture in biology 750654S 2-5 ECTS

Practical training 750615S 10-15 ECTS

Research training 750613S 2-14 ECTS

Research group seminar 750661S 2-5 ECTS

Thursday seminar in biology 750618S 2 ECTS

Kaamos symposium 750629S 2 ECTS

Basic identification of animals, vertebrates 755334A 4 ECTS

Basic identification of animals, invertebrates 755335A 4 ECTS

Examination on optional topics in biology 750349A 2-6 ECTS

Optional examinations in environmental protection 750699S 2-6 ECTS

Aquatic ecology field course 755321A 5 ECTS

Field course in terrestrial animals 755322A 5 ECTS

Conservation of biodiversity 756347A 5 ECTS

Winter ecology 750377A 5 ECTS

Ecological responses to global change and air pollution in the subarctic (odd years) 756348A 5 ECTS

Functional animal ecology 755324A 5 ECTS

Wildlife management and game animal ecology 755328A 5 ECTS

Plant ecology 756344A 5 ECTS

Identification of plant species, brief OR 756355A 3 ECTS

Identification of plant species, extensive 756354A 5 ECTS

Field course in ecological botany 756343A 5 ECTS

Plant ecophysiology in changing environments (even years) 756304A 5-10 ECTS

Macro fungi 752316A 3 ECTS

Taxonomy and ecology of plants 752656S 2-4 ECTS

Advanced identification of plant species I 752608S 6 ECTS

Advanced identification of plant species II 752625S 5-8 ECTS

Botanical collection 752662S 2-6 ECTS

Symbiosis (odd years) 756649S 5 ECTS

**Compulsory studies for ecology student (bioscience 5 ECTS):**

Molecular methods I 757311A 5 ECTS

*Optional studies (minimum 35 ECTS)*

Information skills for foreign degree students 030008P 1 ECTS

Optional studies can be biology or other subjects 5 ECTS

**Specialisation Bioscience, Major Genetics 120 ECTS**

Compulsory major studies (75 ECTS): Degree Weboodi

Master of science seminar 750678S 5 ECTS

Final examination in biology 750658S 10 ECTS

Pro gradu thesis in biology 750658S 40 ECTS

Maturity exam 750632S 0 ECTS

Molecular methods I 757611S 5 ECTS

Basics in population genetics 757313A 5 ECTS

DNA analysis in population genetics 757618S 10 ECTS

*Optional major studies (minimum 5 ECTS):*

Special seminar in biology 750653S 2-5 ECTS

Special lecture in biology 750654S 2-5 ECTS

Practical training 750615S 10-15 ECTS

Research training 750613S 2-14 ECTS

Research group seminar 750661S 2-5 ECTS

Thursday seminar in biology 750618S 2 ECTS

Kaamos symposium 750629S 2 ECTS

Examination on optional topics in biology 750649S 2-6 ECTS

Basics of bioinformatics 757314A 5 ECTS

Advanced course in bioinformatics 757619S 5 ECTS

Experimental course in evolutionary genomics 757621S 5 ECTS

Methods in genomics and genomics evolution 757620S 5 ECTS

*Optional studies (minimum 40 ECTS)*

Information skills for foreign degree students 030008P 1 ECTS

Optional studies can be biology or other subjects

Quantitative genetics 805338A 5 ECTS

**Ecology and Genetics Research Unit:** <https://www oulu.fi/ecology/>

## Tutkintorakenteet

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

Tutkintorakenteen tila: published

Lukuvuosi: 2019-20

Lukuvuoden alkamispäivämäärä: 01.08.2019

### **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

### **Subsidiary Entity for Subject Teacher (vähintään 30 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)**

H251104: Pedagogical Studies in Master's Degree, 30 op

#### *Compulsory*

410087P: Sociocultural Contexts of Education, 5 op  
 410088P: Philosophical and Ethical Foundations and Objectives of Education, 5 op  
 050123A: Research-Based Subject Didactics, 10 op  
 050124A: Advanced Practice, 5 op  
 050125A: Teacher as a Researcher in Teaching Practice, 5 op

#### **Other studies**

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

Tutkintorakenteen tila: published

Lukuvuosi: 2019-20

Lukuvuoden alkamispäivämäärä: 01.08.2019

### **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

### **Subsidiary Entity for Subject Teacher (vähintään 30 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)**

H251104: Pedagogical Studies in Master's Degree, 30 op

#### *Compulsory*

410087P: Sociocultural Contexts of Education, 5 op

410088P: Philosophical and Ethical Foundations and Objectives of Education, 5 op

050123A: Research-Based Subject Didactics, 10 op

050124A: Advanced Practice, 5 op

050125A: Teacher as a Researcher in Teaching Practice, 5 op

### **Other studies**

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

Tutkintorakenteen tila: published

Lukuvuosi: 2019-20

Lukuvuoden alkamispäivämäärä: 01.08.2019

### **Compulsory major studies (vähintään 70 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

### **Optional major studies (vähintään 2 op)**

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

#### *Choose from*

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, 5 op  
 756604S: Plant ecophysiology in changing environments, 5 op  
 756649S: Symbiosis, 5 op  
 755627S: Advanced population ecology, 5 op  
 754630S: Microbial ecology, 5 op

### **Optional bioscience minor (vähintään 15 op)**

### **Optional minor (vähintään 15 op)**

### **Other studies**

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

Tutkintorakenteen tila: published

Lukuvuosi: 2019-20

Lukuvuoden alkamispäivämäärä: 01.08.2019

### **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**

752688S: Basics of tissue culture, 5 op

751688S: Biotechnology and Molecular Biology of Plants, 10 op

### **Optional Studies in Plant Physiology**

756615S: Physiology of forest trees, 5 op

756627S: Plant hormones, 5 op

### **Optional major studies (vähintään 5 op)**

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

### **Optional ecology minor (vähintään 15 op)**

### **Optional minor (vähintään 15 op)**

### **Other studies (vähintään 1 op)**

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

Tutkintorakenteen tila: published

Lukuvuosi: 2019-20

Lukuvuoden alkamispäivämäärä: 01.08.2019

### **Compulsory major studies (vähintään 75 op)**

Compulsory studies in major for ECOGEN students who will specialize in genetics.

757613S: Basics in population genetics, 5 op

757618S: DNA analysis in population genetics, 10 op

750656S: Final examination in biology, 10 op

750678S: Master of science seminar, 5 op

750632S: Maturity exam, 0 op

757611S: Molecular methods I, 5 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 (compulsory 5 cp) (vähintään 5 op)**

ECOGEN students who will specialize in genetics have to do minimum 5 cp advanced studies in major in order to gain the minimum 80 cp.

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

### **Optional Ecology minor (vähintään 15 op)**

Genetics ECOGEN 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)**

May include also for example Finnish language studies.

030008P: Information Skills for foreign degree students, 1 op

## **B.Sc. Degree in Biology (Bioscience).**

Tutkintorakenteen tila: published

Lukuvuosi: 2019-20

Lukuvuoden alkamispäivämäärä: 01.08.2019

### **Language and Communication Studies (vähintään 6 op)**

#### **Compulsory**

902002Y: English 1 (Reading for Academic Purposes), 2 op  
 902004Y: English 2 (Scientific Communication), 2 op  
 750032Y: Orientation course for new students, 2 op  
 901035Y: Second Official Language (Swedish), Oral Skills, 1 op  
 901034Y: Second Official Language (Swedish), Written Skills, 1 op

#### **Optional**

### **Biology, major subject (vähintään 73 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  
 750173P: Biogeography, 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

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  
 755335A: Identification of animals, invertebrates, 4 op  
 755334A: Identification of animals, vertebrates, 4 op  
 756354A: Identification of plant species, extensive, 5 op  
 756346A: Plant biology lectures, 5 op  
 756343A: Plant ecology field course, 5 op

**Compulsory biology major 5 cr either course 755321A tai 755322A or compulsory**

## 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).

#### Optional

### Subsidiary Entity for Subject Teacher (vähintään 30 op)

**Geography (subsidiary entity for subject teacher)**

### Pedagogical Studies (30 op)

H251103: Pedagogical Studies in Bachelor's Degree, 30 op

#### *Compulsory*

410084P: Education as an Object of Scientific Research, 5 op  
 410085P: Growth, Development and Learning, 5 op  
 410086P: Teaching and Educational Interaction, 5 op  
 050120A: Subject Didactics, 5 op  
 050121A: Basic Practice, 5 op  
 050122A: Broadly Based Subject Didactics, 5 op

### Other studies (vähintään 18 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  
 750032Y: Orientation course for new students, 2 op

#### Optional

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

Tutkintorakenteen tila: published

Lukuvuosi: 2019-20



Lukuvuoden alkamispäivämäärä: 01.08.2019

## **Language and Communication Studies (vähintään 6 op)**

### **Compulsory**

- 902002Y: English 1 (Reading for Academic Purposes), 2 op  
 902004Y: English 2 (Scientific Communication), 2 op  
 750032Y: Orientation course for new students, 2 op  
 901035Y: Second Official Language (Swedish), Oral Skills, 1 op  
 901034Y: Second Official Language (Swedish), Written Skills, 1 op

### **optional**

## **Biology, major studies (vähintään 73 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  
 750173P: Biogeography, 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**

- 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  
 750372A: Evolution and systematics of organisms, 5 op  
 755335A: Identification of animals, invertebrates, 4 op  
 755334A: Identification of animals, vertebrates, 4 op  
 756354A: Identification of plant species, extensive, 5 op  
 756346A: Plant biology lectures, 5 op  
 756343A: Plant ecology field course, 5 op

**Compulsory biology major either course 755321A or 755322A total 5 cr**

### **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: Plant ecology field course, 5 op

### **Optional**

## **Subsidiary Entity for Subject Teacher (vähintään 30 op)**

**Geography (subsidiary entity for subject teacher)**

## Other Subsidiary Entity for Subject Teacher

### Pedagogical Studies (30 op)

H251103: Pedagogical Studies in Bachelor's Degree, 30 op

#### *Compulsory*

410084P: Education as an Object of Scientific Research, 5 op

410085P: Growth, Development and Learning, 5 op

410086P: Teaching and Educational Interaction, 5 op

050120A: Subject Didactics, 5 op

050121A: Basic Practice, 5 op

050122A: Broadly Based Subject Didactics, 5 op

### Other studies (vähintään 18 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

750032Y: Orientation course for new students, 2 op

#### Optional

## B.Sc. Degree in Biology (Bioscience).

Tutkintorakenteen tila: archived

Lukuvuosi: 2019-20

Lukuvuoden alkamispäivämäärä: 01.08.2019

### Language and Communication Studies (vähintään 6 op)

#### Compulsory

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

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

750032Y: Orientation course for new students, 2 op

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

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

#### Optional

### Biology, major subject (vähintään 72 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

750173P: Biogeography, 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  
 750372A: Evolution and systematics of organisms, 5 op  
 750336A: Evolutionary ecology, 5 op  
 755335A: Identification of animals, invertebrates, 4 op  
 755334A: Identification of animals, vertebrates, 4 op  
 756355A: Identification of plant species, brief, 3 op  
 757312A: Molecular evolution, 5 op  
 756346A: Plant biology lectures, 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**

757314A: Basics of bioinformatics, 5 op  
 755320A: Developmental biology-histology, 5 op  
 757311A: Molecular methods I, 5 op  
 756341A: Plant biology practicals, 5 op  
 756353A: Plant developmental biology, 5 op

#### **Optional in BSc, compulsory in MSc**

#### **Optional**

### **Other compulsory minor subject (vähintään 25 op)**

### **Studies in Science (optional) (vähintään 25 op)**

### **Other studies (vähintään 23 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  
 750032Y: Orientation course for new students, 2 op

#### **Optional**

### **B.Sc. Degree in Biology (ecology).**

Tutkintorakenteen tila: published

Lukuvuosi: 2019-20

Lukuvuoden alkamispäivämäärä: 01.08.2019

## **Language and Communication Studies (vähintään 6 op)**

### **Compulsory**

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

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

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

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

### **Optional**

## **Major Studies in Biology (vähintään 73 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

750173P: Biogeography, 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**

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

750372A: Evolution and systematics of organisms, 5 op

750336A: Evolutionary ecology, 5 op

755335A: Identification of animals, invertebrates, 4 op

755334A: Identification of animals, vertebrates, 4 op

756354A: Identification of plant species, extensive, 5 op

757312A: Molecular evolution, 5 op

756346A: Plant biology lectures, 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**

755321A: Aquatic ecology field course, 5 op

755325A: Methods in ecology I, 5 op

755329A: Methods in ecology II, 5 op

756344A: Plant ecology, 5 op

756343A: Plant ecology field course, 5 op

755336A: Population ecology, 10 op

755322A: Terrestrial animals field course, 5 op

Optional in BSc, compulsory in MSc

Optional

### Other compulsory minor subject (vähintään 25 op)

Choose 25 ECTS minor subject studies.

### Other studies (vähintään 18 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  
 750032Y: Orientation course for new students, 2 op

Optional

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

Tutkintorakenteen tila: published

Lukuvuosi: 2019-20

Lukuvuoden alkamispäivämäärä: 01.08.2019

### Compulsory major studies in Ecology (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 biology major studies (vähintään 25 op)

### Subsidiary Entity for Subject Teacher (vähintään 30 op)

Geography (subsidiary entity for subject teacher)

Other Subsidiary Entity for Subject Teacher

### Pedagogical studies (vähintään 30 op)

H251104: Pedagogical Studies in Master's Degree, 30 op

*Compulsory*

410087P: Sociocultural Contexts of Education, 5 op  
 410088P: Philosophical and Ethical Foundations and Objectives of Education, 5 op  
 050123A: Research-Based Subject Didactics, 10 op  
 050124A: Advanced Practice, 5 op  
 050125A: Teacher as a Researcher in Teaching Practice, 5 op

## Other studies

### International Master´s Degree Programme in Ecology and Population Genetics (Major in Ecology).

Tutkintorakenteen tila: published

Lukuvuosi: 2019-20

Lukuvuoden alkamispäivämäärä: 01.08.2019

#### Compulsory major studies in Ecology (vähintään 80 op)

Compulsory studies in major for ECOGEN students who will specialize in ecology.

- 750656S: Final examination in biology, 10 op
- 756650S: Introduction to molecular ecology, 5 op
- 750678S: Master of science seminar, 5 op
- 750632S: Maturity exam, 0 op
- 755625S: Methods in ecology I, 5 op
- 755629S: Methods in ecology II, 5 op
- 755636S: Population ecology, 10 op
- 750658S: Pro gradu thesis in biology, 40 op

#### Optional major studies in Ecology (vähintään 10 op)

Ecology ECOGEN student has to choose minimum 10 cp advanced ecology studies so that the major will be minimum 80 cp.

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

#### Optional Bioscience minor (vähintään 15 op)

Ecology ECOGEN 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.

If the student choose to make this minor the compulsory course 757611S Molecular methods I 5 cp will be included to it. Otherwise the compulsory course 757622S is in *Other studies*.

#### Other studies (vähintään 6 op)

May include also for example Finnish language studies.

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

## Tutkintorakenteisiin kuulumattomat opintokokonaisuudet ja -jaksot

757621S: Experimental course in evolutionary genomics, 5 op

## Opintojaksojen kuvaukset

### Tutkintorakenteisiin kuuluvien opintokohteiden kuvaukset

#### 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:**

Itsenäinen opiskelu: kirjatentti.

**Learning activities and teaching methods:**

Book exam (3 h). Exam is held in Examinarium, instructions: <https://www oulu.fi/forstudents/e-exam>

**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. Timo Muotka):**

- 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 (Annamari Markkola):**

- 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 (Heikki Helanterä):**

- 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.

##### **Plant physiology orientation (prof. Hely Häggman)**

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

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

##### **Assessment methods and criteria:**

Book exam in biology public exam day.

Exam in Examinarium: <http://www oulu.fi/english/studying/examinarium>

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

##### **Grading:**

1-5 / Fail.

##### **Person responsible:**

Dr. Heikki Helanterä, Prof. Hely Häggman, Doc. Annamari Markkola or Prof. Timo Muotka.

##### **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

**Opettajat:** Kari Koivula, Muotka, Timo Tapani

**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 opponing. 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. Timo Muotka.

**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 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. Timo Muotka, Doc. Annamari Markkola and Dr. Heikki Helanerä.

**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:**

Dr. Heikki Helanterä, Prof. Hely Häggman, Doc. Annamari Markkola or Prof. Timo Muotka.

**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.

## H251104: Pedagogical Studies in Master's Degree, 30 op

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Study module

**Vastuuyksikkö:** Faculty of Education

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

*Compulsory*

### 410087P: Sociocultural Contexts of Education, 5 op

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Education

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Vesa Puuronen

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay410087P Sociocultural Contexts of Education (OPEN UNI) 5.0 op

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 ECTS

**Language of instruction:**

Finnish. English for the ITE students.

**Timing:**

1st year

**Learning outcomes:**

After completion the student is able

- to use the central concepts of social sciences in educational research and analyze the related basic issues in various contexts of education and growth
- to apply social, multicultural and juridical issues related to education and schooling in everyday life situations
- to describe the historical, socio-political and professional starting points of Finnish education system and educational politics

**Contents:**

Contents

- The basics of social sciences in educational research
- The possibilities and limitations of education and growth determined by the context, i.e. culture, society and environment

- The social, multicultural and juridical issues related to education
- Education systems as part of the historical development of society
- Education politics as a part of social politics

**Mode of delivery:**

Face-to-face teaching / blended teaching and learning

**Learning activities and teaching methods:**

Basic part 3 ECTS: Lectures for all 14 h, independent working 67 h

The basic part is composed of studying pre-given material, expert lectures (possibly by guest lecturers), and learning task. In addition, the adoption of learning outcomes are measured by separate assignment (e.g. examination or essay).

Seminar part 2 ECTS: Contact teaching in small study programme groups 10 h, independent working 44 h

The assignment can be for instance learning portfolio, which combines the contents of basic part and student's own life-world experiences.

**Target group:**

Students in all study programmes of Faculty of Education

**Prerequisites and co-requisites:**

No

**Recommended optional programme components:**

The course is part of the Basic Studies in Education (25 ECTS)

**Recommended or required reading:**

(in applicable parts; to be negotiated with instructor):

- Arum, R., Beattie, I. R. & Ford, K. (Eds.). (2011). *The Structure of schooling: Readings in the sociology of education*. Los Angeles: SAGE.
- Ballantine, J. H. & Spade, J. Z. (Eds.). (2012). *Schools and society: A sociological approach to education*. Los Angeles: SAGE.
- Demaine, J. (Ed.). (2001). *Sociology of education today*. London: Palgrave.
- Simola, H. (Ed.). (2014). *Finnish education mystery: Historical and sociological essays on schooling in Finland*. London: Routledge.
- Verdugo, R. R. (Ed.). (2014). *Educational reform in Europe: History, culture, and ideology*. Information Age Publishing.
- Original text from one of these theorists: Louis Althusser, Basil Bernstein, Pierre Bourdieu, Michel Foucault, Henry Giroux, Jürgen Habermas, Axel Honneth, Peter Jarvis, Peter McLaren, Paul Willis, or Thomas Ziehe.

**Assessment methods and criteria:**

Basic part 3 ECTS.

Assessment method: Both learning task and examination or essay based on the learning material and lectures.

Seminar part 2 ECTS.

Assessment method: Learning portfolio in study group working

The assessment criteria are weighted in the following way:

- first learning outcome is highlighted in learning task (Basic part)
- all three learning outcomes are highlighted in examination or essay (Basic part)
- third learning outcome is highlighted in portfolio (Seminar part)

In approved (Pass) completion of the course, the use of central concepts of social sciences in educational research and analytical handling of basic issues in various contexts of education and growth is clearly structured, and matters are connected to each other at least to some degree. The handling of social, multicultural and juridical issues related to education and schooling in everyday life situations is reflective, and connections between matters are handled at least to some degree. In addition, the description of the historical, socio-political and professional starting points of Finnish education system and educational politics is clear and appropriate. In all assignments, there has to be a visible plot and mainly the use of references has to be at a good level.

In not approved (Fail) completion of the course, student's study products are unfinished, fragmentary and superficial, matters are presented in disconnected way, or the presentation does not show own thinking nor acquisition to the core themes of the course. Study material is not utilized sufficiently, and references are weakly used.

**Grading:**

pass/fail

**Person responsible:**

Vesa Puuronen (Veli-Matti Ulvinen)

**Working life cooperation:**

The seminar part contains working life cooperation.

**410088P: Philosophical and Ethical Foundations and Objectives of Education, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Education

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Eetu Pikkarainen

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay410088P Philosophical and Ethical Foundations and Objectives of Education (OPEN UNI) 5.0  
op

**ECTS Credits:**

5 ECTS

**Language of instruction:**

Finnish. For ITE students: English

**Timing:**

1st year

**Learning outcomes:**

- Summarize and contrast central concepts and approaches of educational philosophy
- Compare international perspectives on ethics
- Apply concepts related to philosophy and ethics to discuss educational tasks and relationships in global contexts
- Describe their current educational philosophy and explain and illustrate their approach to professional ethics

**Contents:**

- Western and non-western schools of educational philosophy
- Perspectives on global and professional ethics
- Educational implications of different approaches
- Ethical dilemmas in educational contexts

**Mode of delivery:**

Blended teaching

**Learning activities and teaching methods:**

Lectures 20h, seminars 10h, and independent study 105h

**Target group:**

ITE, LO, Taika, Tekno, Vaka, Kako, AO, Avoin, AMOK

**Prerequisites and co-requisites:**

No

**Recommended optional programme components:**

The course is part of Basic Studies in Education

**Recommended or required reading:**

- Freire, P. (1998). *Pedagogy of Freedom: Ethics, Democracy, and Civic Courage*. Oxford: Rowman & Littlefield Publishers.
- Noddings, N. (2005). *Challenge to care in Schools*. 2 nd ed. New York: Teachers' College Press.

**Assessment methods and criteria:**

Active participation,  
Essay

**Grading:**

Pass/Fail

**Person responsible:**

Jouni Peltonen, Eetu Pikkarainen

**Working life cooperation:**

Seminar phase of the course work includes observation task on field.

**050123A: Research-Based Subject Didactics, 10 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Education

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

10 ECTS

**Language of instruction:**

Finnish

**Timing:**

4. year autumn, 1. period

**Learning outcomes:**

The student knows how to

- describe the starting-points of educational research and explain the basics of qualitative and quantitative research.
- make use of didactic research in his/her own subject and compose a thesis in subject didactics.
- choose a relevant research method for his/her study and analyze the research data.
- assess the significance of research in subject didactics for the teaching of his/her own subject and construct the thinking of an inquiring teacher.
- apply the knowledge acquired in the study related to subject didactics in supervised teaching practice.

**Contents:**

Planning and implementation of and reporting on a study in subject didactics. The study can be about

- a teaching experiment
- a study related to the curriculum
- research into knowledge of subject contents
- research on learning materials
- research of learning environments and use of new technologies in teaching
- research on attitudes
- research on hobby activities connected with the subject
- research on assessment methods

The study can be related to primary, secondary or tertiary education. The study can also be involved with the third sector.

Supervised teaching practice involves

- planning and implementation of lessons and blocks of teaching making use of knowledge acquired in studies on subject didactics.
- observation of lessons from the viewpoint of subject didactics

**Mode of delivery:**

Face-to-face teaching, supervised teaching practices in grades 7-9 and in the upper secondary grades of the Oulu Teacher Training School, the Faculty

**Learning activities and teaching methods:**

Lectures 8h, methodological exercises and seminar work, a maximum of 42h, and independent work 195h, including the production of a seminar thesis, preparation to act as opponent to another thesis, and familiarization with the other theses.

In supervised teaching practice, 1 credit equals 27 lessons (45 min each) = 16–17 lessons (75 min each).

- lessons to be given: 2–3 (75 min each)
- lessons to be monitored: 3 (75 min)
- independent work

**Target group:**

Students in the secondary teacher education programme

**Prerequisites and co-requisites:**

**Recommended optional programme components:**

The study module is part of the pedagogical studies in secondary teacher education

**Recommended or required reading:**

Curricula in the Oulu Teacher Training School and the literature to be agreed on at the start of the study module

**Assessment methods and criteria:**

Active participation in teaching, completion of independent assignments, conducting, and acting as an opponent to, a scientific study. Active and committed involvement in supervised teaching practice and related activities.

Pass

The student's performance shows accomplishment in line with the expected learning outcomes at an acceptable level. S/he deals with the theoretical substance of the study module analytically enough, and applies it in an appropriate manner.

In supervised teaching practice, a pass requires observance of the given programme in a manner that corresponds to the grade "good". The study module calls for a good mastery of the subjects to be taught by the student, and application of didactic knowledge in the subjects. The assessment criteria focus on commitment, interaction, target orientation, assessment, and expertise.

**Grading:**

Pass/fail

**Person responsible:**

Raimo Kaasila

**Working life cooperation:**

Non

**050124A: Advanced Practice, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Education

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

5 ECTS

**Language of instruction:**

Finnish

**Timing:**

4. year, 1. period

**Learning outcomes:**

Having completed the study module, the student knows how to

- plan independently for work with pupils and students
- apply his/her knowledge about assessment and plan for and implement assessment of study attainments
- apply in practice the knowledge and skills s/he has learnt before
- apply social, multicultural and legal questions related to education in various situations of everyday life
- discuss the significance of teacher responsibility and take independent responsibility of work as a teacher
- explain the meaning of collaboration between school and home.

**Contents:**

The study module includes the following:

- elaboration of the student's own objectives for the practice
- goal-oriented planning, implementation and assessment of lessons based on curricula so that the self-direction of the pupils is also taken into account
- observation and analysis of teaching
- getting to know the three-tier support in basic education
- utilization of the information and communication technologies in teaching
- familiarization with the collaboration between home and school
- special traits of your own subject.

**Mode of delivery:**

Supervised teaching practice in the basic education grades 7–9 and in the upper secondary school at the Oulu Teacher Training School.

Face-to-face teaching

**Learning activities and teaching methods:**

5 credits = 135 lessons (45 minutes each), out of which 50 lessons (45 min each) of face-to-face teaching and 85 lessons (45 min each) of independent work.

Face-to-face teaching:

- lessons to be given 7–9 (75 min each)
- minimum of lessons to be observed 18 (75 min each)
- individual and group supervision 3–3,5 lessons/week (à 75 min)
- working as a co-teacher in the student's own supervision group
- participation in the practice period information meeting and the lectures forming part of the study module

**Target group:**

Students in the secondary teacher education programme

**Prerequisites and co-requisites:**

Subject didactics

Basic practice

Education as an Object of Scientific Research

**Recommended optional programme components:**

The study module is part of the pedagogical studies in secondary teacher education.

**Recommended or required reading:**

To be agreed on at the start of the study module.

**Assessment methods and criteria:**

Pass

A pass for the study module requires observance of the given programme at a level corresponding to the grade "good" and participation in the information meetings, lectures, supervision sessions and events to be announced separately. The study module calls for good mastery of the subjects to be taught by the student. The assessment criteria focus on commitment, interaction, goal-orientedness and assessment.



Fail

The student's performance is deficient or does not show any accomplishment in line with the expected learning outcomes of the study module.

**Grading:**

Pass/fail

**Person responsible:**

Katja Leinonen and Emilia Manninen

**Working life cooperation:**

Non

**050125A: Teacher as a Researcher in Teaching Practice, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Education

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

5 ECTS

**Language of instruction:**

Finnish

**Timing:**

4. year, 2. period

**Learning outcomes:**

Having completed the study module, the student knows how to

- apply his/her knowledge of educational philosophy in a constructive way when working with other actors in the field of education in the context of philosophical and ethical issues in education
- apply the knowledge and skills s/he has learnt and carry independent responsibility for his/her work as a teacher
- explain the meaning of multiprofessional collaboration in a teacher's work
- discuss the significance of student welfare services in a teacher's work
- analyze and apply the knowledge and skills acquired in previous studies in independent work with pupils and students
- sum up the meaning of assessment in a teacher's work and apply this knowledge in the planning and implementation of assessment.

**Contents:**

The study module includes

- deepening one's own objectives in teaching practice
- observation and analysis of teaching and modules of teaching
- independent, goal-oriented planning, implementation and assessment of a broad teaching package based on curricula in such a way that self-regulation of learning is also taken into account
- taking independent responsibility for teaching
- deepening the teacher's job description (the pupil and familiarization with student welfare, encountering different learners and situations, familiarization with ethical moral issues and values, the learner as an independent, active actor and influential person, familiarization with the collaboration between home and school)
- special traits of the student's own subject

**Mode of delivery:**

Supervised teaching practice in the lower and upper secondary school of the Oulu Teacher Training School

**Learning activities and teaching methods:**

5 credits = 135 lessons (45 minutes each), including 50h (45 min each) of face-to-face teaching and 85h (45 min each) of independent work.

Face-to-face teaching:

- lessons to be given: 9–10, which can also include co-teaching and remedial lessons (75 min each)
- lessons to be monitored: a minimum of 15 (75 min each)
- individual and group supervision 3–3,5 lessons/week (75 min each)
- working as a co-teacher in your own group
- participation in the practice period information meeting and in the lectures forming part of the study module

**Target group:**

Students in the secondary teacher education programme.

**Prerequisites and co-requisites:**

Subject didactics

Basic practice

Advanced practice

**Recommended optional programme components:**

The study module is part of the pedagogical studies in secondary teacher education.

**Recommended or required reading:**

The Oulu Teacher Training School curricula

To be agreed on at the start of the study module.

**Assessment methods and criteria:**

Pass

A pass for the study module requires observance of the given programme at a level that corresponds to the grade “good” as well as participation in the info meetings, lectures, supervision sessions and events to be announced separately. The study module calls for good mastery of the subjects to be taught by the student. The assessment criteria focus on commitment, interaction, target orientation and assessment as well as expertise.

Fail

The student’s performance in the study module is deficient or it does not show accomplishment in line with the expected learning outcomes of the module.

**Grading:**

Pass/fail

**Person responsible:**

Katja Leinonen and Emilia Manninen

**Working life cooperation:**

Non

## 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:**

Itsenäinen opiskelu: kirjatentti.

**Learning activities and teaching methods:**

Book exam (3 h). Exam is held in Examinarium, instructions: <https://www oulu.fi/forstudents/e-exam>

**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. Timo Muotka):**

- 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 litterature agreed with the proferssor

**Plant ecology orientation (Annamari Markkola):**

- 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 (Heikki Helanterä):**

- 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.

**Plant physiologi orientation (prof. Hely Häggman)**

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

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

**Assessment methods and criteria:**

Book exam in biology public exam day.

Exam in Examinarium: <http://www oulu.fi/english/studying/examinarium>

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

**Grading:**

1-5 / Fail.

**Person responsible:**

Dr. Heikki Helanterä, Prof. Hely Häggman, Doc. Annamari Markkola or Prof. Timo Muotka.

**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

**Opettajat:** Kari Koivula, Muotka, Timo Tapani

**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. Timo Muotka.

**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 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. Timo Muotka, Doc. Annamari Markkola and Dr. Heikki Helanerä.

**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:**

Dr. Heikki Helanterä, Prof. Hely Häggman, Doc. Annamari Markkola or Prof. Timo Muotka.

**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.

**H251104: Pedagogical Studies in Master's Degree, 30 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Study module

**Vastuuyksikkö:** Faculty of Education

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

*Compulsory*

**410087P: Sociocultural Contexts of Education, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Education

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Vesa Puuronen

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay410087P Sociocultural Contexts of Education (OPEN UNI) 5.0 op

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 ECTS

**Language of instruction:**

Finnish. English for the ITE students.

**Timing:**

1st year

**Learning outcomes:**

After completion the student is able

- to use the central concepts of social sciences in educational research and analyze the related basic issues in various contexts of education and growth
- to apply social, multicultural and juridical issues related to education and schooling in everyday life situations
- to describe the historical, socio-political and professional starting points of Finnish education system and educational politics

**Contents:**

Contents

- The basics of social sciences in educational research
- The possibilities and limitations of education and growth determined by the context, i.e. culture, society and environment
- The social, multicultural and juridical issues related to education
- Education systems as part of the historical development of society
- Education politics as a part of social politics

**Mode of delivery:**

Face-to-face teaching / blended teaching and learning

**Learning activities and teaching methods:**

Basic part 3 ECTS: Lectures for all 14 h, independent working 67 h

The basic part is composed of studying pre-given material, expert lectures (possibly by guest lecturers), and learning task. In addition, the adoption of learning outcomes are measured by separate assignment (e.g. examination or essay).

Seminar part 2 ECTS: Contact teaching in small study programme groups 10 h, independent working 44 h

The assignment can be for instance learning portfolio, which combines the contents of basic part and student's own life-world experiences.

**Target group:**

Students in all study programmes of Faculty of Education

**Prerequisites and co-requisites:**

No

**Recommended optional programme components:**

The course is part of the Basic Studies in Education (25 ECTS)

**Recommended or required reading:**

(in applicable parts; to be negotiated with instructor):

- Arum, R., Beattie, I. R. & Ford, K. (Eds.). (2011). The Structure of schooling: Readings in the sociology of education. Los Angeles: SAGE.

- Ballantine, J. H. & Spade, J. Z. (Eds.). (2012). Schools and society: A sociological approach to education. Los Angeles: SAGE.
- Demaine, J. (Ed.). (2001). Sociology of education today. London: Palgrave.
- Simola, H. (Ed.). (2014). Finnish education mystery: Historical and sociological essays on schooling in Finland. London: Routledge.
- Verdugo, R. R. (Ed.). (2014). Educational reform in Europe: History, culture, and ideology. Information Age Publishing.
- Original text from one of these theorists: Louis Althusser, Basil Bernstein, Pierre Bourdieu, Michel Foucault, Henry Giroux, Jürgen Habermas, Axel Honneth, Peter Jarvis, Peter McLaren, Paul Willis, or Thomas Ziehe.

#### **Assessment methods and criteria:**

Basic part 3 ECTS.

Assessment method: Both learning task and examination or essay based on the learning material and lectures.

Seminar part 2 ECTS.

Assessment method: Learning portfolio in study group working

The assessment criteria are weighted in the following way:

- first learning outcome is highlighted in learning task (Basic part)
- all three learning outcomes are highlighted in examination or essay (Basic part)
- third learning outcome is highlighted in portfolio (Seminar part)

In approved (Pass) completion of the course, the use of central concepts of social sciences in educational research and analytical handling of basic issues in various contexts of education and growth is clearly structured, and matters are connected to each other at least to some degree. The handling of social, multicultural and juridical issues related to education and schooling in everyday life situations is reflective, and connections between matters are handled at least to some degree. In addition, the description of the historical, socio-political and professional starting points of Finnish education system and educational politics is clear and appropriate. In all assignments, there has to be a visible plot and mainly the use of references has to be at a good level.

In not approved (Fail) completion of the course, student's study products are unfinished, fragmentary and superficial, matters are presented in disconnected way, or the presentation does not show own thinking nor acquisition to the core themes of the course. Study material is not utilized sufficiently, and references are weakly used.

#### **Grading:**

pass/fail

#### **Person responsible:**

Vesa Puuronen (Veli-Matti Ulvinen)

#### **Working life cooperation:**

The seminar part contains working life cooperation.

### **410088P: Philosophical and Ethical Foundations and Objectives of Education, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Education

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Eetu Pikkarainen

**Opintokohteen kielet:** Finnish

#### **Leikkaavuudet:**

ay410088P Philosophical and Ethical Foundations and Objectives of Education (OPEN UNI) 5.0 op



**ECTS Credits:**

5 ECTS

**Language of instruction:**

Finnish. For ITE students: English

**Timing:**

1st year

**Learning outcomes:**

- Summarize and contrast central concepts and approaches of educational philosophy
- Compare international perspectives on ethics
- Apply concepts related to philosophy and ethics to discuss educational tasks and relationships in global contexts
- Describe their current educational philosophy and explain and illustrate their approach to professional ethics

**Contents:**

- Western and non-western schools of educational philosophy
- Perspectives on global and professional ethics
- Educational implications of different approaches
- Ethical dilemmas in educational contexts

**Mode of delivery:**

Blended teaching

**Learning activities and teaching methods:**

Lectures 20h, seminars 10h, and independent study 105h

**Target group:**

ITE, LO, Taika, Tekno, Vaka, Kako, AO, Avoin, AMOK

**Prerequisites and co-requisites:**

No

**Recommended optional programme components:**

The course is part of Basic Studies in Education

**Recommended or required reading:**

- Freire, P. (1998). *Pedagogy of Freedom: Ethics, Democracy, and Civic Courage*. Oxford: Rowman & Littlefield Publishers.
- Noddings, N. (2005). *Challenge to care in Schools*. 2 nd ed. New York: Teachers' College Press.

**Assessment methods and criteria:**Active participation,  
Essay**Grading:**

Pass/Fail

**Person responsible:**

Jouni Peltonen, Eetu Pikkarainen

**Working life cooperation:**

Seminar phase of the course work includes observation task on field.

**050123A: Research-Based Subject Didactics, 10 op****Voimassaolo:** 01.08.2017 -**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Education**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish

**ECTS Credits:**

10 ECTS

**Language of instruction:**

Finnish

**Timing:**

4. year autumn, 1. period

**Learning outcomes:**

The student knows how to

- describe the starting-points of educational research and explain the basics of qualitative and quantitative research.
- make use of didactic research in his/her own subject and compose a thesis in subject didactics.
- choose a relevant research method for his/her study and analyze the research data.
- assess the significance of research in subject didactics for the teaching of his/her own subject and construct the thinking of an inquiring teacher.
- apply the knowledge acquired in the study related to subject didactics in supervised teaching practice.

**Contents:**

Planning and implementation of and reporting on a study in subject didactics. The study can be about

- a teaching experiment
- a study related to the curriculum
- research into knowledge of subject contents
- research on learning materials
- research of learning environments and use of new technologies in teaching
- research on attitudes
- research on hobby activities connected with the subject
- research on assessment methods

The study can be related to primary, secondary or tertiary education. The study can also be involved with the third sector.

Supervised teaching practice involves

- planning and implementation of lessons and blocks of teaching making use of knowledge acquired in studies on subject didactics.
- observation of lessons from the viewpoint of subject didactics

**Mode of delivery:**

Face-to-face teaching, supervised teaching practices in grades 7-9 and in the upper secondary grades of the Oulu Teacher Training School, the Faculty

**Learning activities and teaching methods:**

Lectures 8h, methodological exercises and seminar work, a maximum of 42h, and independent work 195h, including the production of a seminar thesis, preparation to act as opponent to another thesis, and familiarization with the other theses.

In supervised teaching practice, 1 credit equals 27 lessons (45 min each) = 16–17 lessons (75 min each).

- lessons to be given: 2–3 (75 min each)
- lessons to be monitored: 3 (75 min)
- independent work

**Target group:**

Students in the secondary teacher education programme

**Prerequisites and co-requisites:****Recommended optional programme components:**

The study module is part of the pedagogical studies in secondary teacher education

**Recommended or required reading:**

Curricula in the Oulu Teacher Training School and the literature to be agreed on at the start of the study module

**Assessment methods and criteria:**

Active participation in teaching, completion of independent assignments, conducting, and acting as an opponent to, a scientific study. Active and committed involvement in supervised teaching practice and related activities.

Pass

The student's performance shows accomplishment in line with the expected learning outcomes at an acceptable level. S/he deals with the theoretical substance of the study module analytically enough, and applies it in an appropriate manner.

In supervised teaching practice, a pass requires observance of the given programme in a manner that corresponds to the grade "good". The study module calls for a good mastery of the subjects to be taught by the student, and application of didactic knowledge in the subjects. The assessment criteria focus on commitment, interaction, target orientation, assessment, and expertise.

**Grading:**

Pass/fail

**Person responsible:**

Raimo Kaasila

**Working life cooperation:**

Non

**050124A: Advanced Practice, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Education

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

5 ECTS

**Language of instruction:**

Finnish

**Timing:**

4. year, 1. period

**Learning outcomes:**

Having completed the study module, the student knows how to

- plan independently for work with pupils and students
- apply his/her knowledge about assessment and plan for and implement assessment of study attainments
- apply in practice the knowledge and skills s/he has learnt before
- apply social, multicultural and legal questions related to education in various situations of everyday life
- discuss the significance of teacher responsibility and take independent responsibility of work as a teacher
- explain the meaning of collaboration between school and home.

**Contents:**

The study module includes the following:

- elaboration of the student's own objectives for the practice
- goal-oriented planning, implementation and assessment of lessons based on curricula so that the self-direction of the pupils is also taken into account
- observation and analysis of teaching
- getting to know the three-tier support in basic education
- utilization of the information and communication technologies in teaching
- familiarization with the collaboration between home and school
- special traits of your own subject.

**Mode of delivery:**

Supervised teaching practice in the basic education grades 7–9 and in the upper secondary school at the Oulu Teacher Training School.

Face-to-face teaching

**Learning activities and teaching methods:**

5 credits = 135 lessons (45 minutes each), out of which 50 lessons (45 min each) of face-to-face teaching and 85 lessons (45 min each) of independent work.

Face-to-face teaching:

- lessons to be given 7–9 (75 min each)
- minimum of lessons to be observed 18 (75 min each)
- individual and group supervision 3–3,5 lessons/week (à 75 min)
- working as a co-teacher in the student's own supervision group
- participation in the practice period information meeting and the lectures forming part of the study module

**Target group:**

Students in the secondary teacher education programme

**Prerequisites and co-requisites:**

Subject didactics

Basic practice

Education as an Object of Scientific Research

**Recommended optional programme components:**

The study module is part of the pedagogical studies in secondary teacher education.

**Recommended or required reading:**

To be agreed on at the start of the study module.

**Assessment methods and criteria:**

Pass

A pass for the study module requires observance of the given programme at a level corresponding to the grade "good" and participation in the information meetings, lectures, supervision sessions and events to be announced separately. The study module calls for good mastery of the subjects to be taught by the student. The assessment criteria focus on commitment, interaction, goal-orientedness and assessment.

Fail

The student's performance is deficient or does not show any accomplishment in line with the expected learning outcomes of the study module.

**Grading:**

Pass/fail

**Person responsible:**

Katja Leinonen and Emilia Manninen

**Working life cooperation:**

Non

**050125A: Teacher as a Researcher in Teaching Practice, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Education

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

5 ECTS

**Language of instruction:**

Finnish

**Timing:**

4. year, 2. period

**Learning outcomes:**

Having completed the study module, the student knows how to

- apply his/her knowledge of educational philosophy in a constructive way when working with other actors in the field of education in the context of philosophical and ethical issues in education
- apply the knowledge and skills s/he has learnt and carry independent responsibility for his/her work as a teacher
- explain the meaning of multiprofessional collaboration in a teacher's work
- discuss the significance of student welfare services in a teacher's work
- analyze and apply the knowledge and skills acquired in previous studies in independent work with pupils and students
- sum up the meaning of assessment in a teacher's work and apply this knowledge in the planning and implementation of assessment.

**Contents:**

The study module includes

- deepening one's own objectives in teaching practice
- observation and analysis of teaching and modules of teaching
- independent, goal-oriented planning, implementation and assessment of a broad teaching package based on curricula in such a way that self-regulation of learning is also taken into account
- taking independent responsibility for teaching
- deepening the teacher's job description (the pupil and familiarization with student welfare, encountering different learners and situations, familiarization with ethical moral issues and values, the learner as an independent, active actor and influential person, familiarization with the collaboration between home and school)
- special traits of the student's own subject

**Mode of delivery:**

Supervised teaching practice in the lower and upper secondary school of the Oulu Teacher Training School

**Learning activities and teaching methods:**

5 credits = 135 lessons (45 minutes each), including 50h (45 min each) of face-to-face teaching and 85h (45 min each) of independent work.

Face-to-face teaching:

- lessons to be given: 9–10, which can also include co-teaching and remedial lessons (75 min each)
- lessons to be monitored: a minimum of 15 (75 min each)
- individual and group supervision 3–3,5 lessons/week (75 min each)
- working as a co-teacher in your own group
- participation in the practice period information meeting and in the lectures forming part of the study module

**Target group:**

Students in the secondary teacher education programme.

**Prerequisites and co-requisites:**

Subject didactics  
Basic practice  
Advanced practice

**Recommended optional programme components:**

The study module is part of the pedagogical studies in secondary teacher education.

**Recommended or required reading:**

The Oulu Teacher Training School curricula  
To be agreed on at the start of the study module.

**Assessment methods and criteria:**

Pass

A pass for the study module requires observance of the given programme at a level that corresponds to the grade "good" as well as participation in the info meetings, lectures, supervision sessions and events to be announced separately. The study module calls for good mastery of the subjects to be taught by the

student. The assessment criteria focus on commitment, interaction, target orientation and assessment as well as expertise.

Fail

The student's performance in the study module is deficient or it does not show accomplishment in line with the expected learning outcomes of the module.

**Grading:**

Pass/fail

**Person responsible:**

Katja Leinonen and Emilia Manninen

**Working life cooperation:**

Non

## 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:**

Itsenäinen opiskelu: kirjatentti.

**Learning activities and teaching methods:**Book exam (3 h). Exam is held in Examinarium, instructions: <https://www oulu.fi/forstudents/e-exam>**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. Timo Muotka):**

- 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 litterature agreed with the proferssor

**Plant ecology orientation (Annamari Markkola):**

- 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 (Heikki Helanterä):**

- 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.

**Plant physiology orientation (prof. Hely Häggman)**

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

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

**Assessment methods and criteria:**

Book exam in biology public exam day.

Exam in Examinarium: <http://www oulu.fi/english/studying/examinarium>

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

**Grading:**

1-5 / Fail.

**Person responsible:**

Dr. Heikki Helanterä, Prof. Hely Häggman, Doc. Annamari Markkola or Prof. Timo Muotka.

**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

**Opettajat:** Kari Koivula, Muotka, Timo Tapani

**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 opponing. 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. Timo Muotka.

**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 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. Timo Muotka, Doc. Annamari Markkola and Dr. Heikki Helanerä.

**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. 3<sup>rd</sup> autumn, training B.Sc. 3<sup>rd</sup> summer - M.Sc. 1<sup>st</sup> 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 3<sup>rd</sup> 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:**

Ass. Prof. Heikki Helanterä (BS) and Doc. Seppo Rytönen (ECO)..

**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:**

Dr. Heikki Helanterä, Prof. Hely Häggman, Doc. Annamari Markkola or Prof. Timo Muotka.

**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 oppimateriaali:**

**Viitala, Jussi** , , 2005

**Krebs, John R.** , , 1993

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

5 ECTS credits / 133 hours of work.

**Language of instruction:**

English.

**Timing:**

B.Sc. 3<sup>rd</sup> spring or M.Sc. 1<sup>st</sup> 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:**

36 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:**

Learning diary. Exam (voluntary).

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

**Grading:**

1-5 / Fail.

**Person responsible:**

Prof. Arja Kaitala, Doc. Topi Lehtonen and Doc. Olli Loukola.

**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. 1<sup>st</sup> spring (May).

**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, field 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.

*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. Timo Muotka, Dr. Heikki Helanterä and Prof. Hely Häggman.

**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. Timo Muotka, Prof. Hely Häggman and Ass. Prof. Heikki Helanterä.

**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

**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 and seminar work (5 cr); **(2)** 4 days summer excursion (3 cr) if resources allow; participation in excursion necessitates accepted 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. Assessment criteria: Exam. 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, Heikki Mykrä

**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:**

Aquatic animals field course (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 and Dr Heikki Mykrä.

**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

**Opettajat:** Kari Koivula, Muotka, Timo Tapani

**Opintokohteen oppimateriaali:**

**Suomen luonto**, , 1998

**Suomen luonto**, , 1997

**Suomen luonto**, , 1998

**Koli, Lauri** , , 1990

**Siivonen, Lauri** , , 1994

**Koivisto, Ilkka** , , 1984

**Hildén, Olavi**, , 1984

**Koli, Lauri**, , 1984

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

4-8 ECTS credits / 107-213 hours of work.

**Language of instruction:**

Finnish / English.

**Timing:**

M.Sc. 1<sup>st</sup> 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. Timo Muotka.

**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, Lumi Viljakainen

**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. 2<sup>nd</sup> spring or M.Sc. 1<sup>st</sup> spring, ECOGEN ECO and BS.

**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, 36 h exercises (laboratory and computer exercises), seminar, final exam.

**Target group:**

M.Sc. degree: 1st spring ECO optional, ECOGEN eco 1st spring compulsory.

**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:**

ECO: Population ecology 10 cr. (755336A).

**Recommended or required reading:**

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:**

Final exam and seminar.

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

**Grading:**

1-5 / Fail.

**Person responsible:**

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.

**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 oppimateriaali:**

**Eurola, Seppo** , , 1999  
**Opintokohteen kielet:** Finnish

**ECTS Credits:**

5 ECTS credits / 133 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:**

Ecological botany field course (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:**

-

**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 oppimateriaali:**

**Eurola, Seppo** , , 1995

**Eurola, Seppo** , , 1992

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay752692S Mire ecology 5.0 op

**ECTS Credits:**

5 ECTS credits / 133 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:**

Plant ecology field course (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:**

-

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Anna Ruotsalainen

**Opintokohteen oppimateriaali:**

**Salo, Pertti (1)** , , 2006

**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. Microscopy 2 cr.

**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:**

-



**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:**

2-4 ECTS credits / 53-107 hours of work.

**Language of instruction:**

Finnish / English.

**Timing:**

M.Sc. 1<sup>st</sup> or 2<sup>nd</sup> 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 oppimateriaali:**

**Hämet-Ahti, L., Suominen, J., Ulvinen, T. & Uotila, P., , 1998**

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

6 ECTS credits / 160 hours of work.

**Language of instruction:**

Finnish / English

**Timing:**

B.Sc. 3<sup>rd</sup> year, M.Sc. 1<sup>st</sup> 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. Before the studying, a contact to the responsible person is required.

**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. 1<sup>st</sup> or 2<sup>nd</sup> 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. Before the studying, a contact to the responsible person is required.

**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, extensive (756354A).

**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

**Opettajat:** Anna Ruotsalainen  
**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. 3<sup>rd</sup> summer or M.Sc. 1<sup>st</sup> or 2<sup>nd</sup> 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, extensive (756354A), Plant ecology field course (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 English, exercises in Finnish and 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 English (with Finnish and English handouts). The lectures focus on 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 take an exam of the lecture material.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

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

**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:**

Exam (or essay).

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, Kari Koivula

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

2 ECTS credits / 53 hours of work.

**Language of instruction:**

English

**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:**

Doc. Seppo Rytönen and Doc. Kari Koivula.

**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 Verlag.

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 -

**Opiskelumoto:** 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:**

Aquatic ecology field course (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, Heikki Mykrä



**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:**

Aquatic animals field course (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:** Jouni Aspi, Kari Koivula

**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 able to appraise the basics of sustainable harvest of game animals and critically judge different wildlife management methods from the scientific point of view.

**Contents:**

The ecology of game species, their life histories, population dynamics and predator-prey relationships. Hunting ecology: man as predator, management 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 aspects 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, visiting lecturers from relevant research institutes and game administration, 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.

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

**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:** Seppo Rytönen, Annamari Markkola

**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:**

-

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Kari Taulavuori

**Opintokohteen oppimateriaali:**

Hollo, Erkki J. , , 2001

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

5 ECTS / 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.

**Target group:**

Optional to students who are doing the environmental protection 25 cr. study module.

**Prerequisites and co-requisites:**

No.

**Recommended optional programme components:**

Optional 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 488142A 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:** Annamari Markkola, Tolvanen, Anne Kristiina**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, 5 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:**

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.

**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:**

(1) Lectures (8h) and 6 h laboratory practicals; (2) 4 day long field excursion to the Oulanka Research Station (28 h) (3) report concerning course works and seminar presentation; (4) Book exam 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 ecology field course (755321A), Plant ecology field course (756343A), and Basics of 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:**

Activity in practicals and seminar presentation and exam, where one question concern lectures and course works, and 2 question concern book issues.

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:**

-

**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 oppimateriaali:**

**Lambers, Hans** , , 1998

**Prasad, M.N.V (ed.)** , , 1997

**Hall, D.O. et al.** , , 1993

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

5 ECTS credits / 133 hours of work.

**Language of instruction:**

Finnish / English.

**Timing:**

B.Sc. 3<sup>rd</sup> or M.Sc. 1<sup>st</sup> 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, CO<sub>2</sub>, 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:**

Doc. 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:**

-

**755627S: Advanced population ecology, 5 op**

**Voimassaolo:** 01.08.2020 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** English

Ei opintojaksokuvauksia.

**754630S: Microbial ecology, 5 op**

**Voimassaolo:** 01.08.2020 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** English

Ei opintojaksokuvauksia.

**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

**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:**

Itsenäinen opiskelu: kirjatentti.

**Learning activities and teaching methods:**

Book exam (3 h). Exam is held in Examinarium, instructions: <https://www oulu.fi/forstudents/e-exam>

**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. Timo Muotka):**

- 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 (Annamari Markkola):**

- 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 (Heikki Helanterä):**

- 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.

**Plant physiologi orientation (prof. Hely Häggman)**

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

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

**Assessment methods and criteria:**

Book exam in biology public exam day.

Exam in Examinarium: <http://www oulu.fi/english/studying/examinarium>

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

**Grading:**

1-5 / Fail.

**Person responsible:**

Dr. Heikki Helanterä, Prof. Hely Häggman, Doc. Annamari Markkola or Prof. Timo Muotka.

**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

**Opettajat:** Kari Koivula, Muotka, Timo Tapani

**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. Timo Muotka.

**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 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. Timo Muotka, Doc. Annamari Markkola and Dr. Heikki Helanerä.

**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

**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 Dr. Janne Koskimäki.

**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. 3<sup>rd</sup> autumn, training B.Sc. 3<sup>rd</sup> summer - M.Sc. 1<sup>st</sup> 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 3<sup>rd</sup> 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:**

Ass. Prof. Heikki Helanterä (BS) and Doc. Seppo Rytönen (ECO)..

**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:**

Dr. Heikki Helanterä, Prof. Hely Häggman, Doc. Annamari Markkola or Prof. Timo Muotka.

**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 ECTS cr / 133 hours of work.

**Language of instruction:**

English.

**Timing:**

B.Sc. 2<sup>nd</sup> spring BSc, M.Sc. 1<sup>st</sup> spring, ECOGENgen 1st spring, compulsory in M.Sc. degree.

**Learning outcomes:**

Student can explain the fundamental population genetics concepts and models and basics in phylogenetics, and is able to apply these in analysis of data.

**Contents:**

Fundamentals of population genetics (genetic variation, inbreeding, genetic drift, effective population size, mutation, selection, population structure, gene flow), phylogenetic methods and phylogeography.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

22 h lectures, 4 h seminars, 16 h exercises (problem solving and computer exercises), 4 h seminars, take-home exam.

**Target group:**

B.Sc. 2<sup>nd</sup> spring BSc, M.Sc. 1<sup>st</sup> spring, ECOGENgen compulsory 1st spring, genetics: compulsory 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 (805338A).

**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:**

Lectures, problem solving, computer exercises, take-home exam, 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 Basics in 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:**

Deep understanding of population genetic and coalescence theory. Neutral theory and other theories related to genetic polymorphisms. Effect of mutation, linkage disequilibrium and recombination. The relationship between genetic variation, demographic history, mating systems, selection, population structure etc. Identification of natural selection.

**Contents:**

Basics of coalescence theory, DNA sequence analysis methods, investigation of population structure.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

24 h lectures, 3 h seminar, 6 h exercises, 36 h computer exercises, 201 h independent work, reports, take home exam.

**Target group:**

BSg compulsory.

**Prerequisites and co-requisites:**

Basics of population genetics (757313A), Basics of bioinformatics (757314A) is recommended.

**Recommended optional programme components:**

-

**Recommended or required reading:**

Matthew B. Hamilton: Population Genetics.

**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:** Anna-Maria Pirttilä, Häggman, Hely Margaretha

**Opintokohteen oppimateriaali:**

**Collin, Hamish A.** , , 1998

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

5 ECTS credits / 133 hours of work.

**Language of instruction:**

Finnish / English.

**Timing:**

B.Sc. 2<sup>nd</sup> or M.Sc. 1<sup>st</sup> 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, exam.

**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:**

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## **751688S: Biotechnology and Molecular Biology of Plants, 10 op**

**Voimassaolo:** 01.08.2019 - 31.07.2020

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Häggman, Hely Margaretha

**Opintokohteen kielet:** English

Ei opintojaksokuvauksia.

## 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:**

5 ECTS credits / 133 hours of work.

**Language of instruction:**

Finnish / English.

**Timing:**

M.Sc. 1<sup>st</sup> or 2<sup>nd</sup> 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:**

Seminar, learning diary, essay.

**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 announced in seminar.

**Assessment methods and criteria:**

Learning diary, essay.

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:**

-

## 756627S: Plant hormones, 5 op

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Häggman, Hely Margaretha

**Opintokohteen oppimateriaali:**

Taiz, Lincoln , , 2006

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

5 ECTS credits / 133 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. et al. 2015. Plant Physiology and Development. 6 e. 761 p. Sinauer Associates, Inc. ISBN- 9781605352558 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 and Doc. Anna Maria Pirttilä.

**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.

## **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 ECTS cr / 133 hours of work.

**Language of instruction:**

English.

**Timing:**

B.Sc. 2<sup>nd</sup> spring BSg, M.Sc. 1<sup>st</sup> spring, ECOGENgen 1st spring, compulsory in M.Sc. degree.

**Learning outcomes:**

Student can explain the fundamental population genetics concepts and models and basics in phylogenetics, and is able to apply these in analysis of data.

**Contents:**

Fundamentals of population genetics (genetic variation, inbreeding, genetic drift, effective population size, mutation, selection, population structure, gene flow), phylogenetic methods and phylogeography.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

22 h lectures, 4 h seminars, 16 h exercises (problem solving and computer exercises), 4 h seminars, take-home exam.

**Target group:**

B.Sc. 2<sup>nd</sup> spring BSg, M.Sc. 1<sup>st</sup> spring, ECOGENgen compulsory 1st spring, genetics: compulsory 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 (805338A).

**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:**

Lectures, problem solving, computer exercises, take-home exam, 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 Basics in 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 | Spesific 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:**

Deep understanding of population genetic and coalescence theory. Neutral theory and other theories related to genetic polymorphisms. Effect of mutation, linkage disequilibrium and recombination. The relationship between genetic variation, demographic history, mating systems, selection, population structure etc. Identification of natural selection.

**Contents:**

Basics of coalescence theory, DNA sequence analysis methods, investigation of population structure.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

24 h lectures, 3 h seminar, 6 h exercises, 36 h computer exercises, 201 h independent work, reports, take home exam.

**Target group:**

BSg compulsory.

**Prerequisites and co-requisites:**

Basics of population genetics (757313A), Basics of bioinformatics (757314A) is recommended.

**Recommended optional programme components:**

-

**Recommended or required reading:**

Matthew B. Hamilton: Population Genetics.

**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:**

-

## 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:**

Itsenäinen opiskelu: kirjatentti.

**Learning activities and teaching methods:**

Book exam (3 h). Exam is held in Examinarium, instructions: <https://www oulu.fi/forstudents/e-exam>

**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. Timo Muotka):**

- 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 litterature agreed with the proferssor

**Plant ecology orientation (Annamari Markkola):**

- 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 (Heikki Helanterä):**

- 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.

**Plant physiologi orientation (prof. Hely Häggman)**

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

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

**Assessment methods and criteria:**

Book exam in biology public exam day.

Exam in Examinarium: <http://www oulu.fi/english/studying/examinarium>

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

**Grading:**

1-5 / Fail.

**Person responsible:**

Dr. Heikki Helanterä, Prof. Hely Häggman, Doc. Annamari Markkola or Prof. Timo Muotka.

**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

**Opettajat:** Kari Koivula, Muotka, Timo Tapani

**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. Timo Muotka.

**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 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. Timo Muotka, Doc. Annamari Markkola and Dr. Heikki Helanerä.

**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:** Lumi Viljakainen

**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:**

Student can isolate DNA from different organisms, estimate the quality and measure the quantity of DNA, amplify DNA fragments using polymerase chain reaction, design PCR primers and sequence DNA. The student is able to evaluate the results and optimize the methods.

**Contents:**

Isolation of genomic DNA, amplification of DNA by PCR, primer design, DNA sequencing, molecular cloning, analysis of DNA-sequence and writing scientific reports.

**Mode of delivery:**



Face-to-face teaching.

**Learning activities and teaching methods:**

48 h laboratory work including demonstrations, 50 h independent work including homework and writing 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. Lumi Viljakainen.

**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:**

Dr. Heikki Helanterä, Prof. Hely Häggman, Doc. Annamari Markkola or Prof. Timo Muotka.

**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 ECTS cr / 133 hours of work.

**Language of instruction:**

English.

**Timing:**

B.Sc. 2<sup>nd</sup> spring BSc, M.Sc. 1<sup>st</sup> spring, ECOGENgen 1st spring, compulsory in M.Sc. degree.

**Learning outcomes:**

Student can explain the fundamental population genetics concepts and models and basics in phylogenetics, and is able to apply these in analysis of data.

**Contents:**

Fundamentals of population genetics (genetic variation, inbreeding, genetic drift, effective population size, mutation, selection, population structure, gene flow), phylogenetic methods and phylogeography.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

22 h lectures, 4 h seminars, 16 h exercises (problem solving and computer exercises), 4 h seminars, take-home exam.

**Target group:**

B.Sc. 2<sup>nd</sup> spring BSc, M.Sc. 1<sup>st</sup> spring, ECOGENgen compulsory 1st spring, genetics: compulsory 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 (805338A).

**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:**

Lectures, problem solving, computer exercises, take-home exam, 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 Basics in 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:**

Deep understanding of population genetic and coalescence theory. Neutral theory and other theories related to genetic polymorphisms. Effect of mutation, linkage disequilibrium and recombination. The relationship between genetic variation, demographic history, mating systems, selection, population structure etc. Identification of natural selection.

**Contents:**

Basics of coalescence theory, DNA sequence analysis methods, investigation of population structure.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

24 h lectures, 3 h seminar, 6 h exercises, 36 h computer exercises, 201 h independent work, reports, take home exam.

**Target group:**

BSg compulsory.

**Prerequisites and co-requisites:**

Basics of population genetics (757313A), Basics of bioinformatics (757314A) is recommended.

**Recommended optional programme components:**

-

**Recommended or required reading:**

Matthew B. Hamilton: Population Genetics.

**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:** Lumi Viljakainen**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:**

Student can isolate DNA from different organisms, estimate the quality and measure the quantity of DNA, amplify DNA fragments using polymerase chain reaction, design PCR primers and sequence DNA. The student is able to evaluate the results and optimize the methods.

**Contents:**

Isolation of genomic DNA, amplification of DNA by PCR, primer design, DNA sequencing, molecular cloning, analysis of DNA-sequence and writing scientific reports.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

48 h laboratory work including demonstrations, 50 h independent work including homework and writing 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. Lumi Viljakainen.

**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. Timo Muotka, Dr. Heikki Helanterä and Prof. Hely Häggman.

**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. Timo Muotka, Prof. Hely Häggman and Ass. Prof. Heikki Helanterä.

**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. 3<sup>rd</sup> autumn, training B.Sc. 3<sup>rd</sup> summer - M.Sc. 1<sup>st</sup> 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 3<sup>rd</sup> 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:**

Ass. Prof. Heikki Helanterä (BS) and Doc. Seppo Rytönen (ECO)..

**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:**



Doc. Seppo Rytönen ja Doc. Annamari Markkola (ECO), Dr. Heikki Helanterä and Prof. Hely Häggman (BS).

**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. Timo Muotka, Doc. Annamari Markkola or Dr. Heikki Helanterä.

**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:** Heikki Helanterä**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.

**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. Heikki Helanterä.

**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:**

Presentation (talk) and participation to whole symposium = 2 cr (PhD students, 750929J)

Participation to whole symposium and 5 summaries of presentations = 2 cr (master and bachelor students, 750629S or 750629A, summaries are to be sent to the responsible teacher by email)

poster = 0.5 cr (PhD students, 750929J)

**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, Ph.D. degree.

**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 teacher.

**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. Timo Muotka (ECOa), Doc. Kari Taulavuori (ECOb), Doc. Seppo Rytönen (ECOa), Doc. Annamari Markkola (ECOb), Dr. Heikki Helanterä (BSg) and Prof. Hely Häggman (BSb).

**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:**

English.

**Timing:**

ECOGEN.

**Learning outcomes:**

After the course the student can explain and is able to use the basic methods to analyse nucleotide and protein sequences. Student learns how to use various databases, can explain the 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, 6 h seminar, 20 h exercises, independent work.

**Target group:**

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

**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

**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:**

-

**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:** Heikki Helanterä**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:**

Ass. Prof. Heikki Helanterä.

**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:** Klintrup, Outi-Mirjami**Opintokohteen kielet:** English**ECTS Credits:**

1 ECTS credits / 27 hours of work

**Language of instruction:**

English

**Timing:**

International students in their 1st academic year, of Master's Degree Programme in Environmental Engineering and Industrial Engineering and Management (Product Management). The course is held once in the autumn semester, during period II and, once in the spring semester, during period IV.

**Learning outcomes:**

Upon completion of the course, the students:

- can search scientific information for their thesis,
- know how to evaluate search results and information sources,
- understand the principles of scientific publishing,
- can use a reference management tool.

**Contents:**

Scientific information retrieval and the search terms, the most important databases and publication channels of the discipline, tools for evaluating the quality of scientific information and RefWorks reference management tool.

**Mode of delivery:**

Blended teaching

**Learning activities and teaching methods:**

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

**Target group:**

The course is compulsory for the international students of Master's Degree Programme in Environmental Engineering (BEE) and for the Master's Degree Programme in Industrial Engineering and Management (Product Management), and optional for other degree students working on their diploma/master's thesis.

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

Web learning material: "Finding scientific information" <http://libguides oulu.fi/findinginformation>

**Assessment methods and criteria:**

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

**Grading:**

Pass/fail

**Person responsible:**

Ursula Heinikoski

**Working life cooperation:**

-

**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 who choose English as their foreign language in the following B.Sc. degree programmes:

**Faculty of Natural Sciences**

- Biology
- Mathematical and Physical Sciences

**Faculty of Technology**

- Department of Chemistry

**Oulu Mining School**

- Geosciences degree programme

Please consult your faculty's 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 / 54 hours of work

**Language of instruction:**

English

**Timing:**

Biology: 1st year spring term (periods 3 and 4)

Mathematical and Physical Sciences: 1st year autumn term (periods 1 and 2)

Chemistry: 1st year autumn term (periods 1 and 2)

Geosciences: 1st year spring term (periods 3 and 4)

**Learning outcomes:**

By the end of the course, you are expected to

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

**Contents:**

The course will focus on reading strategies; these include recognising how texts are organised, 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 and independent study

**Learning activities and teaching methods:**

The English 1 course is adapted to accommodate many different fields of study, and thus the materials and implementation methods of the course vary. There will be 26 hours of guided teaching events and 28 hours of independent study, either individually or in a group. A more detailed course description and list of homework tasks will be provided by the teacher.

**Target group:**

**Faculty of Natural Sciences:** Biology, Mathematical & Physical Sciences

**Faculty of Technology:** Chemistry

**Oulu Mining School:** Geosciences

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

Students are also required to take [English 2 902004Y](#), or [English 4 902005Y](#), AFTER completion of this course.

**Recommended or required reading:**

Course materials will be provided in electronic form or will be accessible from the university library.

**Assessment methods and criteria:**

Student work is monitored by continuous assessment, and students are required to participate regularly and actively in all contact teaching provided. During the course, there will be three monthly tests on material covered so far. The assessment of the course is based on the learning outcomes listed above.

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. Please contact your own faculty for information.

## 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 [Common European Framework of Reference](#) scale.

**Status:**

This course is mandatory for students who choose English as their foreign language in the following B.Sc. degree programmes:

**Faculty of Natural Sciences:**

Biology

Mathematical & Physical Sciences

**Faculty of Technology:**

Chemistry

**Oulu Mining School:**

Geoscience degree programme

*Note: Information Processing Science students who began their studies in autumn 2017 or later will take [English 4](#) instead.*

Please consult your faculty's study guide to establish the language requirements of your own degree programme.

**Required proficiency level:**

Students taking this course must have had English as the A1 or A2 language at school or have equivalent skills. The course [English 1 \(902002Y\)](#) is a pre-requisite, unless exempted.

**ECTS Credits:**

2 ECTS credits / 54 hours work.

**Language of instruction:**

English

**Timing:**

Biology: 2nd year autumn term (periods 1 and 2)

Mathematic and Physical Sciences 1st year spring term (periods 3 and 4)

Chemistry: 2nd year spring term (periods 3 and 4)

Geosciences: 2nd year spring term (periods 3 and 4)

**Learning outcomes:**

By the end of the course, you are expected to have demonstrated the ability to:

- **use appropriate strategies and techniques for communicating effectively** in English in an academic context

- **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 is given to support the classroom learning.

**Mode of delivery:**

Contact teaching

**Learning activities and teaching methods:**

The English 2 course is tailored to the needs of students in different fields of study, and thus the materials and implementation methods of the course vary between groups. The teacher will provide a more detailed schedule and list of homework tasks. There will be 26 hours of guided teaching events and 28 hours of independent work, including both individual and group work.

Individual learning methods: autonomous learning tasks, practice in lecture listening and written tasks in preparation for classroom lessons

Group work: Preparation of presentations in groups

**Target group:**

2<sup>nd</sup> year students of Biology, Chemistry, Geoscience

1<sup>st</sup> year students of Mathematical and Physical Sciences (new programme)

**Prerequisites and co-requisites:**

Pre-requisite course: [902002Y Englannin kieli 1](#)

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

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

The assessment of the course is based on the learning outcomes of the course.

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

**Grading:**

Pass / fail.

**Person responsible:**

Karen Niskanen

**Working life cooperation:**

-

**Other information:**

-

**750032Y: Orientation course for new students, 2 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** General Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Annamari Markkola, Vanhatalo, Minna-Liisa

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

750031Y Orientation course for new students 1.0 op

**ECTS Credits:**

2 ECTS credits / 53 hours of work.

**Language of instruction:**

Finnish.

**Timing:**

B.Sc. 1 st 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 (PSP) for the first study year.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

Tutorials, presentations, seminar of major subjects, computer exercises, independent studying, total 53 h.

**Target group:**

BIOL: compulsory.

**Prerequisites and co-requisites:**

No.

**Recommended optional programme components:**

-

**Recommended or required reading:**

Study syllabus.

**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:**

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

## 750124P: Basics of ecology, 5 op

**Opiskelumuoto:** Basic 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. 1<sup>st</sup> 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. Moodle excersises.

**Learning activities and teaching methods:**

The course is based on the course book Manuel C. Molles Jr. & Anna A. Sher 2018. Ecology: concepts and applications (8. ed), lectures describing the major sections of the book, and the Moodle exercises based on the book. After each lecture, a new Moodle-exercise will open (in ca. 2 week-intervals). Assessment is based on the success in the Moodle-exercises. There is no final exam in the course.

**Target group:**

Compulsory biology students.

**Prerequisites and co-requisites:**

No.

**Recommended optional programme components:**

-

**Recommended or required reading:**

Manuel C. Molles Jr. & Anna A. Sher 2018. Ecology: concepts and applications (8. p).

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

**Assessment methods and criteria:**

Passing the course demands passing all the Moodle-exercises in the given time. Assessment is based on the success in the Moodle-exercises.

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:**

-

## 750173P: Biogeography, 5 op

**Voimassaolo:** 01.08.2019 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Kvist, Laura Irmeli

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

750373A Biogeography 5.0 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. The student will have an understanding also of how human impact changes distributions and how the Finnish biota has been formed.

**Contents:**

The course introduces basic models and theories of distribution of organisms in the environment, offering historical, evolutionary, geographical, climatic and ecological explanations. It also introduces research methods used in biogeography and offers understanding on human impact on distributions and a special part of distributions of biota in Finland.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

34 h lectures, independent work (3 cr, a learning diary), exam.

**Target group:**

BSc: 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) and Evolution, systematics and morphology of organisms, practicals (750374A)

**Recommended or required reading:**

Cox, C.B. & Moore, P.D. 2005: Biogeography. An ecological and evolutionary approach (7 ed.), Blackwell Publishing Ltd, tai Cox, C.B. & Moore, P.D. 2010: Biogeography. An ecological and evolutionary approach (8 ed.), John Wiley & Sons Inc. Euroala, S. 1999: Kasvipeitteemme alueellisuus. Oulanka Reports. Oulu. 116 s.

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

**Assessment methods and criteria:**

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.

**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, Jaana Jurvansuu

**Opintokohteen oppimateriaali:**

**Heino, Jyrki (2)** , , 2004

**Alberts, B. ym.**, , 2008

**Lodish et al.**, , 2003

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

5 ECTS credits / 133 hours of work.

**Language of instruction:**

Finnish.

**Timing:**

B.Sc. 1<sup>st</sup> autumn.

**Learning outcomes:**

The student is familiar with cellular structure and functions of 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, and understands the material basis and mechanisms of this continuity.

**Contents:**

The course is divided into three sections: genetics, animal cell biology, and plant cell biology. The course covers the structural and functional characteristics of plant and animal cells as well as the genetic basis of life (nucleic acids and inheritance, mitosis, meiosis, and gene expression).

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

38 h lectures, 97 h independent work, and home assignments.

**Target group:**

Compulsory to the biology and biochemistry students.

**Prerequisites and co-requisites:**

Good knowledge of upper elementary school biology and chemistry.

**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 Reece ym. 2014: Campbell et al. 2018. Biology: A Global Approach (10e), Pearson, 1350 s. 978-1-292-00865-3, Alberts, B. ym. 2015: Molecular Biology of the Cell (6e), Garland Science Publishing, London, 1464 s. ISBN: 9780815345244, Heino J. & Vuento M. 2014: Biokemian ja solubiologian perusteet (3. painos) WSOY Pro Oy, Helsinki, Jones R. ym. 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. Each lecture section has a separate exam, which all have to be passed to do the course (no credits to Oodi are given before all three exams are passed). No final exam. The exams have to be done within one academic year.

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 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:** Heikki Helanterä

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

757122P Concepts of genetics for biochemists 3.0 op

753124P General genetics 4.0 op

**ECTS Credits:**

5 ECTS credits / 133 hours of work.

**Language of instruction:**

Finnish.

**Timing:**

B.Sc. 1st 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 (11. 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:**

Ass. Prof. Heikki Helanterä.

**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:** Lumi Viljakainen

**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, 1st spring.

**Learning outcomes:**

Knowledge on essential phenomena in genetics as well as know-how to work in a genetics laboratory. Student understands and is able to apply and analyse fundamental genetical experiments.

**Contents:**

Investigation of Mendelian inheritance; gene mapping and nonadditive effects of genes using cross-breeding; basics of population genetics; investigation of mitosis and meiosis using cytogenetical methods.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

14 h demonstrations, 30 h exercises, 82 h independent work including home work and 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:**

Exam, report, participation to exercises.

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:**

-

## 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. 3<sup>rd</sup> 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:**

Independent studying: book exam.

**Learning activities and teaching methods:**

Students make workshops where they discuss content of the books. Book exam (3 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:**

**BSg**

- Klug, W. S., Cummings, M. R., Spencer, C.A ja Palladino M.A.: Concepts of Genetics (11. ed.). Pearson & Prentice Hall, 2015  
Choose one option:
  - Molecular genetics: chapters 1-3, 6, 8-22, 24 OR
  - Population and Evolutionary Genetics: chapters 1, 3-6, 10-18, 20-23, 25.
- responsible teacher doc. Heikki Helanterä

**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 doc. Kari Koivula

**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 doc. Annamari Markkola

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:**

Doc. Heikki Helanterä, Prof. Hely Häggman, Doc. Annamari Markkola and Doc. Kari Koivula.

**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 accepts it. 3 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. Timo Muotka or Dr. Heikki Helanterä.

**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

**Opettajat:** Seppo Rytkönen

**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: 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.

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

**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 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 coordinator, computer classes, peer groups Prof. Timo Muotka  
*B.Sc. thesis:* Prof. Timo Muotka, Dr. Heikki Helanterä and Prof. Hely Häggman.

**Working life cooperation:**

No.

**Other information:**

-

## 755335A: Identification of animals, invertebrates, 4 op

**Voimassaolo:** 01.08.2019 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Kari Koivula

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

4 ECTS credits / 106 hours of work.

**Language of instruction:**

Finnish / English.

**Timing:**

B.Sc. 1st spring.

**Learning outcomes:**

Main point of the course is to learn to identify Finnish invertebrate species at the family level from museum samples. Basics of species' ecology and classification of organisms.

**Contents:**

During 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:**

9 h lectures in Finnish, 16 h exercises, self-learning, exam.

**Target group:**

ECOGEN.

**Prerequisites and co-requisites:**

No.

**Recommended optional programme components:**

This course is needed for attending courses Terrestrial animals field course (755322A) and Aquatic ecology field course (755321A).

**Recommended or required reading:**

Check course wiki pages.

**Assessment methods and criteria:**

Species 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:**

-

## 755334A: Identification of animals, vertebrates, 4 op

**Voimassaolo:** 01.08.2019 -

**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 6.0 op

**ECTS Credits:**

4 ECTS credits / 106 hours of work.

**Language of instruction:**

Finnish / English.

**Timing:**

B.Sc. 1st autumn.

**Learning outcomes:**

Main goal is to learn to identify Finnish animal species (vertebrate) from museum samples.

**Contents:**

During the autumn semester (9 h lectures in Finnish, 16 h exercises based on museum samples, exam).

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

14 h lectures in Finnish, 14 h exercises, one exercise group with English lectures, self-learning, exam.

**Target group:**

ECOGEN.

**Prerequisites and co-requisites:**

No.

**Recommended optional programme components:**

This course is needed for attending courses Terrestrial animals field course (755322A) and Aquatic ecology field course (755321A).

**Recommended or required reading:**

Check course Moodle pages.

**Assessment methods and criteria:**

Species 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:**

-

## 756354A: Identification of plant species, extensive, 5 op

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Annamari Markkola

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

5 ECTS credits / 133 hours of work.

**Language of instruction:**

Finnish / English.

**Timing:**

BSc 1st autumn.

**Learning outcomes:**

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

**Contents:**

Demonstrations and/or independent stud of ca. 350 vascular plants, mosses and lichens in the boreal vegetation zone. 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. 350 plant species. In the identification exam student has to know specimens scientific name and family in latin.

**Target group:**

BSc degree: ECO and TEA 5 cr compulsory.

**Prerequisites and co-requisites:**

No.

**Recommended optional programme components:**

Course done as 5 cr (756654S) is prerequisite for the Plant ecology field course (756643S) and for the advanced plant species identification courses (752608S and 752625S).

**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:**

Two species identification subexams (756354A-01 and 756354A-02). 5 cr without the course 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:**

-

## 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.

**Recommended optional programme components:**

This course is a prerequisite for course Plant biology practicals (756341A) and Biotechnology and Molecular Biology of Plants (751688S).

**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:**

-

## 756343A: Plant ecology field course, 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:**

-

## H251103: Pedagogical Studies in Bachelor's Degree, 30 op

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Study module

**Vastuuyksikkö:** Faculty of Education



**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

*Compulsory*

**410084P: Education as an Object of Scientific Research, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Education

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay410084P Education as an Object of Scientific Research (OPEN UNI) 5.0 op

**ECTS Credits:**

5 ECTS

**Language of instruction:**

Finnish. English for the ITE students

**Timing:**

1st year

**Learning outcomes:**

- Describe the main paradigms and define the basic concepts of educational sciences
- Identify some of the most influential, past and contemporary educational theorists
- Consider the role of practical and theoretical knowledge in teacher's profession
- Apply the acquired knowledge in classroom discussions on international and multicultural learning and teaching contexts
- Is able to read academic texts on education and write a short academic essay

**Contents:**

- Theories and concepts of mainstream educational sciences and intercultural education
- Formal education, informal and non-formal education
- Epistemology: forms of knowledge and knowledge production, cultural impact on knowledge construction
- Teacher's professional development and teacher's identity formation
- Basics of academic writing

**Mode of delivery:**

Blended teaching

**Learning activities and teaching methods:**

Lectures 20h, seminars 10h, and independent study 105h

**Target group:**

ITE, LO, Taika, Tekno, Vaka, Kako, AO, Avoin, AMOK

**Prerequisites and co-requisites:**

No

**Recommended optional programme components:**

The course is part of Basic Studies in Education

**Assessment methods and criteria:**

Active participation,  
Essay

**Grading:**

Pass/Fail

**Person responsible:**

Sari Harmoinen

**410085P: Growth, Development and Learning, 5 op****Voimassaolo:** 01.08.2017 -**Opiskelumuoto:** Basic Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Education**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Hanni-Mari Muukkonen-van der Meer**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

ay410085P Growth, Development and Learning (OPEN UNI) 5.0 op

**ECTS Credits:**

5 ECTS

**Language of instruction:**

Finnish

**Timing:**

1st year

**Learning outcomes:**

- Identify the most prominent paradigms and their representatives of psychology
- Apply acquired knowledge of psychological trends and theories in classroom discussions considering different learning and teaching environments
- Compare different perspectives of educational psychology focusing on age- and culture-specific aspects in education and upbringing

**Contents:**

- The most prominent paradigms and their representatives of psychology
- Age- and culture-specific issues of developmental psychology
- The impact of educational psychology in intercultural and inclusive education

**Mode of delivery:**

Blended teaching

**Learning activities and teaching methods:**

Lectures 20h, seminars 10h, and independent study 105h

**Target group:**

ITE, LO, Taika, Tekno, Vaka, Kako, AO, Avoin, AMOK

**Prerequisites and co-requisites:**

No

**Recommended optional programme components:**

The course is part of Basic Studies in Education

**Recommended or required reading:**

Theories of Development: concepts and applications. 6 th ed. 2011.

**Assessment methods and criteria:**

Active participation,

Essay

**Grading:**

Pass/Fail

**Working life cooperation:**

Seminar phase of the course work includes observation task on field.

**410086P: Teaching and Educational Interaction, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Education

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Järvelä Sanna

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay410086P Teaching and Educational Interaction (OPEN UNI) 5.0 op

**ECTS Credits:**

5 ECTS

**Language of instruction:**

Finnish. For ITE students English

**Timing:**

1st year

**Learning outcomes:**

- Summarize the historical development of paradigms in learning sciences
- Identify the most significant paradigms of learning sciences and the most influential theorists
- Relate the different cultural circumstances on pedagogical solutions in learning and teaching situations with special focus on intercultural competence
- Discuss the possibilities offered by ICT in teaching and learning situations

**Contents:**

- historical overview of the development of learning paradigms
- theories of intercultural/ transformative/ experiential and social learning and critical pedagogy
- the impact of cultural factors on learning and teaching
- learning and teaching as individual and social-psychological phenomena
- the role of ICT in learning and teaching

**Mode of delivery:**

Blended teaching

**Learning activities and teaching methods:**

Lectures 20h, seminars 10h, and independent study 105h

**Target group:**

ITE, LO, Taika, Tekno, Vaka, Kako, AO, Avoin, AMOK

**Prerequisites and co-requisites:**

No

**Recommended optional programme components:**

The course is part of Basic Studies in Education

**Assessment methods and criteria:**

Active participation,  
Essay

**Grading:**

Pass/fail

**Person responsible:**

Sanna Järvelä

**Working life cooperation:**

Seminar phase of the course work includes observation task on field.

**050120A: Subject Didactics, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Education

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

5 ECTS

**Language of instruction:**

Finnish

**Timing:**

3. year, 3. period

**Learning outcomes:**

Having completed the study module, the student knows how to

- identify the fundamentals of his/her own subject in terms of subject didactics.
- describe different approaches to and methods of teaching, learning environments and teaching aids in his/her own subject..
- identify the meaning of interaction in teaching.
- apply national curricula to plan teaching in his/her own subject.
- develop working methods that take into account the pupils' special needs.
- develop capabilities to assess their own teaching and the students' knowledge.

**Contents:**

- curricula
- the grounds of the didactics of their own subject
- teaching methods, learning environments, teaching aids
- interaction in teaching
- differentiation and encountering difference
- assessment

**Mode of delivery:**

Face-to-face teaching

**Learning activities and teaching methods:**

Lectures 4 h, small group teaching 34 h, independent work 95h

**Target group:**

Secondary teacher students

**Recommended optional programme components:**

The study module is part of the pedagogical studies for secondary teachers.

**Recommended or required reading:**

To be agreed on at the start of the study module.

**Assessment methods and criteria:**

Assessment may be based, among other things, on active participation in teaching, completion of independent and online assignments, visits, planning of a teaching episode, production of learning materials, diary, blog, video, examination, etc.

pass

The student's performance shows accomplishment that is in line with the expected learning outcomes on an acceptable level. S/he deals with theoretical substance analytically enough and applies it in an appropriate manner.

fail

The student's performance shows shortcomings in accomplishments based on the expected learning outcomes, or is unfinished.

**Grading:**

Pass/ fail

**Person responsible:**

Sari Harmoinen

**Working life cooperation:**

Non

**050121A: Basic Practice, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Education

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

5 ECTS

**Language of instruction:**

Finnish

**Timing:**

3. year, 4. period

**Learning outcomes:**

Having completed the study module, the student knows how to

- describe the meaning of a teacher's pedagogical thinking and activity and interaction in educational and teaching situations
- construct an idea of the school's activity, the learners, the teacher's work and school as a work community
- put into use in the lessons the contents of both the core curriculum and ones specific to the subject
- develop his/her capability to encounter different learners in all teaching and learning situations
- identify the teacher's task to guide the learners into active agents who set objectives for their own learning and solve problems.

**Contents:**

- supervised and independent observation of teaching
- getting to know the school practices and teachers' work and curricula
- familiarisation with the practice plan and assessment criteria
- setting of objectives for yourself
- planning of teaching based on curricula
- implementation and assessment of lessons alone and as a co-teacher
- design of teaching materials and lessons in such a way that the learners are taken into account as active agents
- development of skills of interaction and getting to know the students, encounters with different learners
- getting to know the educational technology used in the school
- special traits of your own subject.

**Mode of delivery:**

Supervised teaching practice in the lower and upper secondary levels of Oulu Teacher Training School  
Face-to-face teaching

**Learning activities and teaching methods:**

5 credits = 135 lessons (45 minutes each), out of which face-to-face teaching 50 lessons (45 min each) and independent work 85 lessons (45 min each).

Face-to-face teaching:

- participation in the planning, implementation and assessment of 6–8 lessons (75 min each)
- observation of at least 15 lessons (75 min each), which must also include lessons in subjects other than your own
- working as a co-teacher in your own small group

- individual and group supervision 3–3,5 times (75 min each) per week
- participation in the practice information meeting and lectures belonging to the practice period

**Target group:**

Secondary teacher education students

**Prerequisites and co-requisites:**

Subject didactics

Education as an Object of Scientific Research

**Recommended optional programme components:**

The study module is part of the pedagogical studies in secondary teacher education

**Recommended or required reading:**

To be agreed on at the start of the study module

**Assessment methods and criteria:**

Pass

To pass the course the student shall successfully follow the programme assigned to him/her and attend the information meeting, lectures, supervision sessions and any specifically required events. Passing the course requires mastery of the subjects taught by the student. The assessment criteria focus on commitment and interaction.

Fail

The student's performance in the study module is deficient or does not show accomplishment in line with the expected learning outcomes.

**Grading:**

Pass/fail

**Person responsible:**

Katja Leinonen and Emilia Manninen

**Working life cooperation:**

Non

**050122A: Broadly Based Subject Didactics, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Education

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

5 ECTS

**Language of instruction:**

Finnish

**Timing:**

3. year, 4. period

**Learning outcomes:**

Having completed the course, the student knows how to

- discuss the meaning of the curriculum in the planning and assessment of teaching.
- apply the general and subject-specific foundations and main working and teaching methods laid down in the curriculum in various learning environments.
- apply what s/he has learnt in his/her teaching and school community.
- discuss research in subject didactics.
- describe the most essential contents of a special course selected by him/herself, and apply it in his /her work as a teacher.

**Contents:**

- curriculum
- preconceptions
- motivation
- interaction
- lesson plan
- illustration
- educational technology
- assessment
- orientation to research in subject didactics

The contents of the special course are permanent and/or annually changing courses supporting the general objectives of teachers' pedagogical studies, offered by the Teacher Training School, educational sciences, subject didactics, and subject departments. There will be an effort to organise courses in the following areas, among others: ICT, ethics, inquiring orientation in teaching and as part of professional identity, civic skills and active citizenship, responsibility for the environment, multiculturalism and interculturalism, encountering difference, multiprofessional collaboration, functional mathematics, teaching literature and writing, etc.

**Mode of delivery:**

Face-to-face teaching

**Learning activities and teaching methods:**

Lectures 4h

Subject didactics/Oulu Teacher Training School: small group teaching, a maximum of 10h (45 minutes each)

University subject didactics: small group teaching, 8h

Implementation of the special course: face-to-face teaching 16h, independent work 97h

**Target group:**

Students in the secondary teacher education programme

**Recommended optional programme components:**

The study module is part of the pedagogical studies for secondary teachers.

**Recommended or required reading:**

To be agreed on at the start of the study module.

**Assessment methods and criteria:**

For example, active participation in teaching, completion of independent and online assignments, visit, planning of a teaching episode, production of learning materials, diary, blog, video, examination, etc.

Pass

The student's performance shows accomplishment in line with the expected learning outcomes at an acceptable level. S/he deals with the theoretical substance of the study module analytically enough, and applies it in an appropriate manner.

Fail

The student's performance reveals deficiencies in accomplishment relative to the expected learning outcomes, or is unfinished.

**Grading:**

Pass/fail

**Person responsible:**

Minna Säaskilahti

**Working life cooperation:**

Non

**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:**

The course is held in the autumn semester, during period 1

**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:**

Minna Tiainen

**Working life cooperation:**

No

## 030005P: Information Skills, 1 op

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Technology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Ursula Heinikoski

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

030004P Introduction to Information Retrieval 0.0 op

**ECTS Credits:**

1 ECTS credits / 27 hours of work

**Language of instruction:**

Finnish

**Timing:**

Architecture 3. spring semester, period I; Biochemistry 3. autumn semester; Biology 3. autumn semester, period I; Chemistry 3. autumn semester, period II; Computer Science and Engineering 2. spring semester, period IV; Electronics and Communications Engineering 3. spring semester; Geosciences 2. spring semester, period IV; Geography 1. and 3. spring semester, period III; Industrial Engineering and Management 3. year (Master's degree students in Industrial Engineering and Management 1st year.); Information Processing Sciences 1. year; Mathematics and Physics 1. spring semester, period III; Mechanical Engineering 3. year; Mining Engineering and Mineral Processing 3. year; Process and Environmental Engineering 2. year, period II.

**Learning outcomes:**

Upon completion of the course, the students:

- can search scientific information,

- can use the most important databases of their discipline,
- know how to evaluate search results and information sources,
- can use the reference management tool

**Contents:**

Scientific information retrieval process, the most important databases and publication channels of the discipline, evaluation of the reliability of information sources and RefWorks reference management tool.

**Mode of delivery:**

Blended teaching: classroom training, web-based learning material and exercises, a group assignment.

**Learning activities and teaching methods:**

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

**Target group:**

Compulsory for all bachelor degree students of Faculty of Information Technology and Electrical Engineering, Faculty of Technology and Faculty of Science. Compulsory also for those Master's degree students in Industrial Engineering and Management who have no earlier studies in the information skills. Optional for the students of biochemistry.

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

Web learning material Tieteellisen tiedonhankinnan opas <http://libguides oulu.fi/tieteellintiedonhankinta> (in Finnish)

**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:**

Ursula Heinikoski

**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 to A Second Course in Statistics.

**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:**

Hanna Heikkinen and Jari Päckilä

**Working life cooperation:**

No

**Other information:**

-

**750032Y: Orientation course for new students, 2 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** General Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Annamari Markkola, Vanhatalo, Minna-Liisa

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

750031Y Orientation course for new students 1.0 op

**ECTS Credits:**

2 ECTS credits / 53 hours of work.

**Language of instruction:**

Finnish.

**Timing:**

B.Sc. 1 st 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 (PSP) for the first study year.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

Tutorials, presentations, seminar of major subjects, computer exercises, independent studying, total 53 h.

**Target group:**

BIOL: compulsory.

**Prerequisites and co-requisites:**

No.

**Recommended optional programme components:**

-

**Recommended or required reading:**

Study syllabus.

**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:**

N.N. and Ph. Lic. Minna Vanhatalo.

**Working life cooperation:**

No.

**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 who choose English as their foreign language in the following B.Sc. degree programmes:

**Faculty of Natural Sciences**

- Biology
- Mathematical and Physical Sciences

**Faculty of Technology**

- Department of Chemistry

**Oulu Mining School**

- Geosciences degree programme

Please consult your faculty's 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 / 54 hours of work

**Language of instruction:**

English

**Timing:**

Biology: 1st year spring term (periods 3 and 4)

Mathematical and Physical Sciences: 1st year autumn term (periods 1 and 2)

Chemistry: 1st year autumn term (periods 1 and 2)

Geosciences: 1st year spring term (periods 3 and 4)

**Learning outcomes:**

By the end of the course, you are expected to

- have acquired effective vocabulary-learning techniques

- be able to distinguish parts of words to infer meanings
- be able to utilise your knowledge of text structure and cohesion markers to understand academic texts
- to be able to extract information and learn content from English readings in scientific and professional contexts

**Contents:**

The course will focus on reading strategies; these include recognising how texts are organised, 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 and independent study

**Learning activities and teaching methods:**

The English 1 course is adapted to accommodate many different fields of study, and thus the materials and implementation methods of the course vary. There will be 26 hours of guided teaching events and 28 hours of independent study, either individually or in a group. A more detailed course description and list of homework tasks will be provided by the teacher.

**Target group:**

**Faculty of Natural Sciences:** Biology, Mathematical & Physical Sciences

**Faculty of Technology:** Chemistry

**Oulu Mining School:** Geosciences

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

Students are also required to take [English 2 902004Y](#), or [English 4 902005Y](#), AFTER completion of this course.

**Recommended or required reading:**

Course materials will be provided in electronic form or will be accessible from the university library.

**Assessment methods and criteria:**

Student work is monitored by continuous assessment, and students are required to participate regularly and actively in all contact teaching provided. During the course, there will be three monthly tests on material covered so far. The assessment of the course is based on the learning outcomes listed above.

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. Please contact your own faculty for information.

**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 [Common European Framework of Reference](#) scale.

**Status:**

This course is mandatory for students who choose English as their foreign language in the following B.Sc. degree programmes:

**Faculty of Natural Sciences:**

Biology

Mathematical & Physical Sciences

**Faculty of Technology:**

Chemistry

**Oulu Mining School:**

Geoscience degree programme

*Note: Information Processing Science students who began their studies in autumn 2017 or later will take [English 4](#) instead.*

Please consult your faculty's study guide to establish the language requirements of your own degree programme.

**Required proficiency level:**

Students taking this course must have had English as the A1 or A2 language at school or have equivalent skills. The course [English 1 \(902002Y\)](#) is a pre-requisite, unless exempted.

**ECTS Credits:**

2 ECTS credits / 54 hours work.

**Language of instruction:**

English

**Timing:**

Biology: 2nd year autumn term (periods 1 and 2)

Mathematic and Physical Sciences 1st year spring term (periods 3 and 4)

Chemistry: 2nd year spring term (periods 3 and 4)

Geosciences: 2nd year spring term (periods 3 and 4)

**Learning outcomes:**

By the end of the course, you are expected to have demonstrated the ability to:

- **use appropriate strategies and techniques for communicating effectively** in English in an academic context
- **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 is given to support the classroom learning.

**Mode of delivery:**

Contact teaching

**Learning activities and teaching methods:**

The English 2 course is tailored to the needs of students in different fields of study, and thus the materials and implementation methods of the course vary between groups. The teacher will provide a more detailed schedule and list of homework tasks. There will be 26 hours of guided teaching events and 28 hours of independent work, including both individual and group work.

Individual learning methods: autonomous learning tasks, practice in lecture listening and written tasks in preparation for classroom lessons

Group work: Preparation of presentations in groups

**Target group:**

2<sup>nd</sup> year students of Biology, Chemistry, Geoscience

1<sup>st</sup> year students of Mathematical and Physical Sciences (new programme)

**Prerequisites and co-requisites:**

Pre-requisite course: [902002Y Englannin kieli 1](#)

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

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

The assessment of the course is based on the learning outcomes of the course.

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

**Grading:**

Pass / fail.

**Person responsible:**

Karen Niskanen

**Working life cooperation:**

-

**Other information:**

-

## 750032Y: Orientation course for new students, 2 op

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** General Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Annamari Markkola, Vanhatalo, Minna-Liisa

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

750031Y Orientation course for new students 1.0 op

**ECTS Credits:**

2 ECTS credits / 53 hours of work.

**Language of instruction:**

Finnish.

**Timing:**

B.Sc. 1 st 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 (PSP) for the first study year.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

Tutorials, presentations, seminar of major subjects, computer exercises, independent studying, total 53 h.

**Target group:**

BIOL: compulsory.

**Prerequisites and co-requisites:**

No.

**Recommended optional programme components:**

-

**Recommended or required reading:**

Study syllabus.

**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:**

N.N. and 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

### **750124P: Basics of ecology, 5 op**

**Opiskelumuoto:** Basic 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. 1<sup>st</sup> 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. Moodle excersises.

**Learning activities and teaching methods:**

The course is based on the course book Manuel C. Molles Jr. & Anna A. Sher 2018. Ecology: concepts and applications (8. ed), lectures describing the major sections of the book, and the Moodle exercises based on the book. After each lecture, a new Moodle-exercise will open (in ca. 2 week-intervals). Assessment is based on the success in the Moodle-exercises. There is no final exam in the course.

**Target group:**

Compulsory biology students.



**Prerequisites and co-requisites:**

No.

**Recommended optional programme components:**

-

**Recommended or required reading:**

Manuel C. Molles Jr. &amp; Anna A. Sher 2018. Ecology: concepts and applications (8. p).

The availability of the literature can be checked from [this link](#).**Assessment methods and criteria:**

Passing the course demands passing all the Moodle-exercises in the given time. Assessment is based on the success in the Moodle-exercises.

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:**

-

**750173P: Biogeography, 5 op****Voimassaolo:** 01.08.2019 -**Opiskelumuoto:** Basic Studies**Laji:** Course**Vastuuyksikkö:** Field of Biology**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Kvist, Laura Irmeli**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

750373A Biogeography 5.0 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. The student will have an understanding also of how human impact changes distributions and how the Finnish biota has been formed.

**Contents:**

The course introduces basic models and theories of distribution of organisms in the environment, offering historical, evolutionary, geographical, climatic and ecological explanations. It also introduces research methods used in biogeography and offers understanding on human impact on distributions and a special part of distributions of biota in Finland.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

34 h lectures, independent work (3 cr, a learning diary), exam.

**Target group:**

BSc: 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) and Evolution, systematics and morphology of organisms, practicals (750374A)

**Recommended or required reading:**

Cox, C.B. & Moore, P.D. 2005: Biogeography. An ecological and evolutionary approach (7 ed.), Blackwell Publishing Ltd, tai Cox, C.B. & Moore, P.D. 2010: Biogeography. An ecological and evolutionary approach (8 ed.), John Wiley & Sons Inc. Euroola, S. 1999: Kasvipteitteemme alueellisuus. Oulanka Reports. Oulu. 116 s.

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

**Assessment methods and criteria:**

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.

**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, Jaana Jurvansuu

**Opintokohteen oppimateriaali:**

**Heino, Jyrki (2)** , , 2004

**Alberts, B. ym.**, , 2008

**Lodish et al.**, , 2003

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

5 ECTS credits / 133 hours of work.

**Language of instruction:**

Finnish.

**Timing:**

B.Sc. 1<sup>st</sup> autumn.

**Learning outcomes:**

The student is familiar with cellular structure and functions of 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, and understands the material basis and mechanisms of this continuity.

**Contents:**

The course is divided into three sections: genetics, animal cell biology, and plant cell biology. The course covers the structural and functional characteristics of plant and animal cells as well as the genetic basis of life (nucleic acids and inheritance, mitosis, meiosis, and gene expression).

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

38 h lectures, 97 h independent work, and home assignments.

**Target group:**

Compulsory to the biology and biochemistry students.

**Prerequisites and co-requisites:**

Good knowledge of upper elementary school biology and chemistry.

**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 Reece ym. 2014: Campbell et al. 2018. Biology: A Global Approach (10e), Pearson, 1350 s. 978-1-292-00865-3, Alberts, B. ym. 2015: Molecular Biology of the Cell (6e), Garland Science Publishing, London, 1464 s. ISBN: 9780815345244, Heino J. & Vuento M. 2014: Biokemian ja solubiologian perusteet (3. painos) WSOY Pro Oy, Helsinki, Jones R. ym. 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. Each lecture section has a separate exam, which all have to be passed to do the course (no credits to Oodi are given before all three exams are passed). No final exam. The exams have to be done within one academic year.

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 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:** Heikki Helanterä

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

757122P Concepts of genetics for biochemists 3.0 op

753124P General genetics 4.0 op

**ECTS Credits:**

5 ECTS credits / 133 hours of work.

**Language of instruction:**

Finnish.

**Timing:**

B.Sc. 1st 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 (11. 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:**

Ass. Prof. Heikki Helanterä.

**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:** Lumi Viljakainen

**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, 1st spring.

**Learning outcomes:**

Knowledge on essential phenomena in genetics as well as know-how to work in a genetics laboratory. Student understands and is able to apply and analyse fundamental genetical experiments.

**Contents:**

Investigation of Mendelian inheritance; gene mapping and nonadditive effects of genes using cross-breeding; basics of population genetics; investigation of mitosis and meiosis using cytogenetical methods.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

14 h demonstrations, 30 h exercises, 82 h independent work including home work and 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:**

Exam, report, participation to exercises.

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:**

-

**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. 3<sup>rd</sup> 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:**

Independent studying: book exam.

**Learning activities and teaching methods:**

Students make workshops where they discuss content of the books. Book exam (3 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:****BSg**

- Klug, W. S., Cummings, M. R., Spencer, C.A ja Palladino M.A.: Concepts of Genetics (11. ed.). Pearson & Prentice Hall, 2015  
Choose one option:
  - Molecular genetics: chapters 1-3, 6, 8-22, 24 OR
  - Population and Evolutionary Genetics: chapters 1, 3-6, 10-18, 20-23, 25.
- responsible teacher doc. Heikki Helanterä

**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 doc. Kari Koivula

### 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 doc. Annamari Markkola

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:

Doc. Heikki Helanterä, Prof. Hely Häggman, Doc. Annamari Markkola and Doc. Kari Koivula.

#### 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 accepts it. 3 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. Timo Muotka or Dr. Heikki Helanterä.

**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

**Opettajat:** Seppo Rytönen

**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: 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.

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

**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 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 coordinator, computer classes, peer groups Prof. Timo Muotka

*B.Sc. thesis:* Prof. Timo Muotka, Dr. Heikki Helanterä and Prof. Hely Häggman.

**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:** Annamari Markkola, Marko Mutanen

**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:**

Doc. Annamari Markkola, Doc. Risto Virtanen and Doc. Marko Mutanen.

**Working life cooperation:**

No.

**Other information:**

-

## 755335A: Identification of animals, invertebrates, 4 op



**Voimassaolo:** 01.08.2019 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Kari Koivula

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

4 ECTS credits / 106 hours of work.

**Language of instruction:**

Finnish / English.

**Timing:**

B.Sc. 1st spring.

**Learning outcomes:**

Main point of the course is to learn to identify Finnish invertebrate species at the family level from museum samples. Basics of species' ecology and classification of organisms.

**Contents:**

During 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:**

9 h lectures in Finnish, 16 h exercises, self-learning, exam.

**Target group:**

ECOGEN.

**Prerequisites and co-requisites:**

No.

**Recommended optional programme components:**

This course is needed for attending courses Terrestrial animals field course (755322A) and Aquatic ecology field course (755321A).

**Recommended or required reading:**

Check course wiki pages.

**Assessment methods and criteria:**

Species 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:**

-

## 755334A: Identification of animals, vertebrates, 4 op

**Voimassaolo:** 01.08.2019 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Kari Koivula

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

755333A Identification of animals 6.0 op

**ECTS Credits:**

4 ECTS credits / 106 hours of work.

**Language of instruction:**

Finnish / English.

**Timing:**

B.Sc. 1st autumn.

**Learning outcomes:**

Main goal is to learn to identify Finnish animal species (vertebrate) from museum samples.

**Contents:**

During the autumn semester (9 h lectures in Finnish, 16 h exercises based on museum samples, exam).

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

14 h lectures in Finnish, 14 h exercises, one exercise group with English lectures, self-learning, exam.

**Target group:**

ECOGEN.

**Prerequisites and co-requisites:**

No.

**Recommended optional programme components:**

This course is needed for attending courses Terrestrial animals field course (755322A) and Aquatic ecology field course (755321A).

**Recommended or required reading:**

Check course Moodle pages.

**Assessment methods and criteria:**

Species 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:**

-

## 756354A: Identification of plant species, extensive, 5 op

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Annamari Markkola

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

5 ECTS credits / 133 hours of work.

**Language of instruction:**

Finnish / English.

**Timing:**

BSc 1st autumn.

**Learning outcomes:**

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

**Contents:**

Demonstrations and/or independent stud of ca. 350 vascular plants, mosses and lichens in the boreal vegetation zone. 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. 350 plant species. In the identification exam student has to know specimens scientific name and family in latin.

**Target group:**

BSc degree: ECO and TEA 5 cr compulsory.

**Prerequisites and co-requisites:**

No.

**Recommended optional programme components:**

Course done as 5 cr (756654S) is prerequisite for the Plant ecology field course (756643S) and for the advanced plant species identification courses (752608S and 752625S).

**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:**

Two species identification subexams (756354A-01 and 756354A-02). 5 cr without the course 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:**

-

## 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.

**Recommended optional programme components:**

This course is a prerequisite for course Plant biology practicals (756341A) and Biotechnology and Molecular Biology of Plants (751688S).

**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:**

-

## 756343A: Plant ecology field course, 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:**

-

**756343A: Plant ecology field course, 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. &amp; 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:**

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:**

-

## H251103: Pedagogical Studies in Bachelor's Degree, 30 op

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Study module

**Vastuuyksikkö:** Faculty of Education

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

*Compulsory*

### 410084P: Education as an Object of Scientific Research, 5 op

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Education

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay410084P Education as an Object of Scientific Research (OPEN UNI) 5.0 op

**ECTS Credits:**

5 ECTS

**Language of instruction:**

Finnish. English for the ITE students

**Timing:**

1st year

**Learning outcomes:**

- Describe the main paradigms and define the basic concepts of educational sciences
- Identify some of the most influential, past and contemporary educational theorists
- Consider the role of practical and theoretical knowledge in teacher's profession
- Apply the acquired knowledge in classroom discussions on international and multicultural learning and teaching contexts
- Is able to read academic texts on education and write a short academic essay

**Contents:**

- Theories and concepts of mainstream educational sciences and intercultural education
- Formal education, informal and non-formal education
- Epistemology: forms of knowledge and knowledge production, cultural impact on knowledge construction
- Teacher's professional development and teacher's identity formation
- Basics of academic writing

**Mode of delivery:**

Blended teaching

**Learning activities and teaching methods:**

Lectures 20h, seminars 10h, and independent study 105h

**Target group:**

ITE, LO, Taika, Tekno, Vaka, Kako, AO, Avoin, AMOK

**Prerequisites and co-requisites:**

No

**Recommended optional programme components:**

The course is part of Basic Studies in Education

**Assessment methods and criteria:**

Active participation,  
Essay

**Grading:**

Pass/Fail

**Person responsible:**

Sari Harmoinen

**410085P: Growth, Development and Learning, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Education

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Hanni-Mari Muukkonen-van der Meer

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay410085P Growth, Development and Learning (OPEN UNI) 5.0 op

**ECTS Credits:**

5 ECTS

**Language of instruction:**

Finnish

**Timing:**

1st year

**Learning outcomes:**

- Identify the most prominent paradigms and their representatives of psychology
- Apply acquired knowledge of psychological trends and theories in classroom discussions considering different learning and teaching environments
- Compare different perspectives of educational psychology focusing on age- and culture-specific aspects in education and upbringing

**Contents:**

- The most prominent paradigms and their representatives of psychology
- Age- and culture-specific issues of developmental psychology
- The impact of educational psychology in intercultural and inclusive education

**Mode of delivery:**

Blended teaching

**Learning activities and teaching methods:**

Lectures 20h, seminars 10h, and independent study 105h

**Target group:**

ITE, LO, Taika, Tekno, Vaka, Kako, AO, Avoin, AMOK

**Prerequisites and co-requisites:**

No

**Recommended optional programme components:**

The course is part of Basic Studies in Education

**Recommended or required reading:**

Theories of Development: concepts and applications. 6 th ed. 2011.

**Assessment methods and criteria:**

Active participation,  
Essay

**Grading:**

Pass/Fail

**Working life cooperation:**

Seminar phase of the course work includes observation task on field.

**410086P: Teaching and Educational Interaction, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Education

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Järvelä Sanna

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay410086P Teaching and Educational Interaction (OPEN UNI) 5.0 op

**ECTS Credits:**

5 ECTS

**Language of instruction:**

Finnish. For ITE students English

**Timing:**

1st year

**Learning outcomes:**

- Summarize the historical development of paradigms in learning sciences
- Identify the most significant paradigms of learning sciences and the most influential theorists
- Relate the different cultural circumstances on pedagogical solutions in learning and teaching situations with special focus on intercultural competence
- Discuss the possibilities offered by ICT in teaching and learning situations

**Contents:**

- historical overview of the development of learning paradigms
- theories of intercultural/ transformative/ experiential and social learning and critical pedagogy
- the impact of cultural factors on learning and teaching
- learning and teaching as individual and social-psychological phenomena
- the role of ICT in learning and teaching

**Mode of delivery:**

Blended teaching

**Learning activities and teaching methods:**

Lectures 20h, seminars 10h, and independent study 105h

**Target group:**

ITE, LO, Taika, Tekno, Vaka, Kako, AO, Avoin, AMOK

**Prerequisites and co-requisites:**

No

**Recommended optional programme components:**

The course is part of Basic Studies in Education

**Assessment methods and criteria:**



Active participation,  
Essay

**Grading:**

Pass/fail

**Person responsible:**

Sanna Järvelä

**Working life cooperation:**

Seminar phase of the course work includes observation task on field.

**050120A: Subject Didactics, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Education

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

5 ECTS

**Language of instruction:**

Finnish

**Timing:**

3. year, 3. period

**Learning outcomes:**

Having completed the study module, the student knows how to

- identify the fundamentals of his/her own subject in terms of subject didactics.
- describe different approaches to and methods of teaching, learning environments and teaching aids in his/her own subject..
- identify the meaning of interaction in teaching.
- apply national curricula to plan teaching in his/her own subject.
- develop working methods that take into account the pupils' special needs.
- develop capabilities to assess their own teaching and the students' knowledge.

**Contents:**

- curricula
- the grounds of the didactics of their own subject
- teaching methods, learning environments, teaching aids
- interaction in teaching
- differentiation and encountering difference
- assessment

**Mode of delivery:**

Face-to-face teaching

**Learning activities and teaching methods:**

Lectures 4 h, small group teaching 34 h, independent work 95h

**Target group:**

Secondary teacher students

**Recommended optional programme components:**

The study module is part of the pedagogical studies for secondary teachers.

**Recommended or required reading:**

To be agreed on at the start of the study module.

**Assessment methods and criteria:**

Assessment may be based, among other things, on active participation in teaching, completion of independent and online assignments, visits, planning of a teaching episode, production of learning materials, diary, blog, video, examination, etc.

pass

The student's performance shows accomplishment that is in line with the expected learning outcomes on an acceptable level. S/he deals with theoretical substance analytically enough and applies it in an appropriate manner.

fail

The student's performance shows shortcomings in accomplishments based on the expected learning outcomes, or is unfinished.

**Grading:**

Pass/ fail

**Person responsible:**

Sari Harmoinen

**Working life cooperation:**

Non

**050121A: Basic Practice, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Education

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

5 ECTS

**Language of instruction:**

Finnish

**Timing:**

3. year, 4. period

**Learning outcomes:**

Having completed the study module, the student knows how to

- describe the meaning of a teacher's pedagogical thinking and activity and interaction in educational and teaching situations
- construct an idea of the school's activity, the learners, the teacher's work and school as a work community
- put into use in the lessons the contents of both the core curriculum and ones specific to the subject
- develop his/her capability to encounter different learners in all teaching and learning situations
- identify the teacher's task to guide the learners into active agents who set objectives for their own learning and solve problems.

**Contents:**

- supervised and independent observation of teaching
- getting to know the school practices and teachers' work and curricula
- familiarisation with the practice plan and assessment criteria
- setting of objectives for yourself
- planning of teaching based on curricula
- implementation and assessment of lessons alone and as a co-teacher
- design of teaching materials and lessons in such a way that the learners are taken into account as active agents
- development of skills of interaction and getting to know the students, encounters with different learners
- getting to know the educational technology used in the school

- special traits of your own subject.

**Mode of delivery:**

Supervised teaching practice in the lower and upper secondary levels of Oulu Teacher Training School  
Face-to-face teaching

**Learning activities and teaching methods:**

5 credits = 135 lessons (45 minutes each), out of which face-to-face teaching 50 lessons (45 min each) and independent work 85 lessons (45 min each).

Face-to-face teaching:

- participation in the planning, implementation and assessment of 6–8 lessons (75 min each)
- observation of at least 15 lessons (75 min each), which must also include lessons in subjects other than your own
- working as a co-teacher in your own small group
- individual and group supervision 3–3,5 times (75 min each) per week
- participation in the practice information meeting and lectures belonging to the practice period

**Target group:**

Secondary teacher education students

**Prerequisites and co-requisites:**

Subject didactics

Education as an Object of Scientific Research

**Recommended optional programme components:**

The study module is part of the pedagogical studies in secondary teacher education

**Recommended or required reading:**

To be agreed on at the start of the study module

**Assessment methods and criteria:**

Pass

To pass the course the student shall successfully follow the programme assigned to him/her and attend the information meeting, lectures, supervision sessions and any specifically required events. Passing the course requires mastery of the subjects taught by the student. The assessment criteria focus on commitment and interaction.

Fail

The student's performance in the study module is deficient or does not show accomplishment in line with the expected learning outcomes.

**Grading:**

Pass/fail

**Person responsible:**

Katja Leinonen and Emilia Manninen

**Working life cooperation:**

Non

**050122A: Broadly Based Subject Didactics, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Education

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

5 ECTS

**Language of instruction:**

Finnish

**Timing:**

3. year, 4. period

**Learning outcomes:**

Having completed the course, the student knows how to

- discuss the meaning of the curriculum in the planning and assessment of teaching.
- apply the general and subject-specific foundations and main working and teaching methods laid down in the curriculum in various learning environments.
- apply what s/he has learnt in his/her teaching and school community.
- discuss research in subject didactics.
- describe the most essential contents of a special course selected by him/herself, and apply it in his /her work as a teacher.

**Contents:**

- curriculum
- preconceptions
- motivation
- interaction
- lesson plan
- illustration
- educational technology
- assessment
- orientation to research in subject didactics

The contents of the special course are permanent and/or annually changing courses supporting the general objectives of teachers' pedagogical studies, offered by the Teacher Training School, educational sciences, subject didactics, and subject departments. There will be an effort to organise courses in the following areas, among others: ICT, ethics, inquiring orientation in teaching and as part of professional deintity, civic skills and active citizenship, responsibility for the environment, multiculturalism and interculturalism, encountering difference, multiprofessional collaboration, functional mathematics, teaching literature and writing, etc.

**Mode of delivery:**

Face-to-face teaching

**Learning activities and teaching methods:**

Lectures 4h

Subject didactics/Oulu Teacher Training School: small group teaching, a maximum of 10h (45 minutes each)

University subject didactics: small group teaching, 8h

Implementation of the special course: face-to-face teaching 16h, independent work 97h

**Target group:**

Students in the secondary teacher education programme

**Recommended optional programme components:**

The study module is part of the pedagogical studies for secondary teachers.

**Recommended or required reading:**

To be agreed on at the start of the study module.

**Assessment methods and criteria:**

For example, active participation in teaching, completion of independent and online assignments, visit, planning of a teaching episode, production of learning materials, diary, blog, video, examination, etc.

Pass

The student's performance shows accomplishment in line with the expected learning outcomes at an acceptable level. S/he deals with the theoretical substance of the study module analytically enough, and applies it in an appropriate manner.

Fail

The student's performance reveals deficiencies in accomplishment relative to the expected learning outcomes, or is unfinished.

**Grading:**

Pass/fail

**Person responsible:**

Minna Säaskilahti

**Working life cooperation:**

Non

**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 Päckilä**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 Päckilä

**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:**

The course is held in the autumn semester, during period 1

**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:**

Minna Tiainen

**Working life cooperation:**

No

## 030005P: Information Skills, 1 op

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Technology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Ursula Heinikoski

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

030004P Introduction to Information Retrieval 0.0 op

**ECTS Credits:**

1 ECTS credits / 27 hours of work

**Language of instruction:**

Finnish

**Timing:**

Architecture 3. spring semester, period I; Biochemistry 3. autumn semester; Biology 3. autumn semester, period I; Chemistry 3. autumn semester, period II; Computer Science and Engineering 2. spring semester, period IV; Electronics and Communications Engineering 3. spring semester; Geosciences 2. spring semester, period IV; Geography 1. and 3. spring semester, period III; Industrial Engineering and Management 3. year (Master's degree students in Industrial Engineering and Management 1st year.); Information Processing Sciences 1. year; Mathematics and Physics 1. spring semester, period III; Mechanical Engineering 3. year; Mining Engineering and Mineral Processing 3. year; Process and Environmental Engineering 2. year, period II.

**Learning outcomes:**

Upon completion of the course, the students:

- can search scientific information,
- can use the most important databases of their discipline,
- know how to evaluate search results and information sources,
- can use the reference management tool

**Contents:**

Scientific information retrieval process, the most important databases and publication channels of the discipline, evaluation of the reliability of information sources and RefWorks reference management tool.

**Mode of delivery:**

Blended teaching: classroom training, web-based learning material and exercises, a group assignment.

**Learning activities and teaching methods:**

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

**Target group:**

Compulsory for all bachelor degree students of Faculty of Information Technology and Electrical Engineering, Faculty of Technology and Faculty of Science. Compulsory also for those Master's degree students in Industrial Engineering and Management who have no earlier studies in the information skills. Optional for the students of biochemistry.

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

Web learning material Tieteellisen tiedonhankinnan opas <http://libguides.oulu.fi/tieteellintiedonhankinta> (in Finnish)

**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:**

Ursula Heinikoski

**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 Päckilä

**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 to A Second Course in Statistics.

**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:**

Hanna Heikkinen and Jari Pääkkilä

**Working life cooperation:**

No

**Other information:**

-

**750032Y: Orientation course for new students, 2 op****Voimassaolo:** 01.08.2017 -**Opiskelumuoto:** General Studies**Laji:** Course**Vastuuyksikkö:** Field of Biology**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Annamari Markkola, Vanhatalo, Minna-Liisa**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

750031Y Orientation course for new students 1.0 op

**ECTS Credits:**

2 ECTS credits / 53 hours of work.

**Language of instruction:**

Finnish.

**Timing:**

B.Sc. 1 st 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 (PSP) for the first study year.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

Tutorials, presentations, seminar of major subjects, computer exercises, independent studying, total 53 h.

**Target group:**

BIOL: compulsory.

**Prerequisites and co-requisites:**

No.

**Recommended optional programme components:**

-

**Recommended or required reading:**

Study syllabus.

**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:**

N.N. and Ph. Lic. Minna Vanhatalo.

**Working life cooperation:**

No.

**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 who choose English as their foreign language in the following B.Sc. degree programmes:

**Faculty of Natural Sciences**

- Biology
- Mathematical and Physical Sciences

**Faculty of Technology**

- Department of Chemistry

**Oulu Mining School**

- Geosciences degree programme

Please consult your faculty's 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 / 54 hours of work

**Language of instruction:**

English

**Timing:**

Biology: 1st year spring term (periods 3 and 4)

Mathematical and Physical Sciences: 1st year autumn term (periods 1 and 2)

Chemistry: 1st year autumn term (periods 1 and 2)

Geosciences: 1st year spring term (periods 3 and 4)

**Learning outcomes:**

By the end of the course, you are expected to

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

**Contents:**

The course will focus on reading strategies; these include recognising how texts are organised, 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 and independent study

**Learning activities and teaching methods:**

The English 1 course is adapted to accommodate many different fields of study, and thus the materials and implementation methods of the course vary. There will be 26 hours of guided teaching events and 28 hours of independent study, either individually or in a group. A more detailed course description and list of homework tasks will be provided by the teacher.

**Target group:**

**Faculty of Natural Sciences:** Biology, Mathematical & Physical Sciences

**Faculty of Technology:** Chemistry

**Oulu Mining School:** Geosciences

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

Students are also required to take [English 2 902004Y](#), or [English 4 902005Y](#), AFTER completion of this course.

**Recommended or required reading:**

Course materials will be provided in electronic form or will be accessible from the university library.

**Assessment methods and criteria:**

Student work is monitored by continuous assessment, and students are required to participate regularly and actively in all contact teaching provided. During the course, there will be three monthly tests on material covered so far. The assessment of the course is based on the learning outcomes listed above.

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. Please contact your own faculty for information.

## 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 [Common European Framework of Reference](#) scale.

**Status:**

This course is mandatory for students who choose English as their foreign language in the following B.Sc. degree programmes:

**Faculty of Natural Sciences:**

Biology

Mathematical & Physical Sciences

**Faculty of Technology:**

Chemistry

**Oulu Mining School:**

Geoscience degree programme

*Note: Information Processing Science students who began their studies in autumn 2017 or later will take [English 4](#) instead.*

Please consult your faculty's study guide to establish the language requirements of your own degree programme.

**Required proficiency level:**

Students taking this course must have had English as the A1 or A2 language at school or have equivalent skills. The course [English 1 \(902002Y\)](#) is a pre-requisite, unless exempted.

**ECTS Credits:**

2 ECTS credits / 54 hours work.

**Language of instruction:**

English

**Timing:**

Biology: 2nd year autumn term (periods 1 and 2)

Mathematic and Physical Sciences 1st year spring term (periods 3 and 4)

Chemistry: 2nd year spring term (periods 3 and 4)

Geosciences: 2nd year spring term (periods 3 and 4)

**Learning outcomes:**

By the end of the course, you are expected to have demonstrated the ability to:

- **use appropriate strategies and techniques for communicating effectively** in English in an academic context
- **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 is given to support the classroom learning.

**Mode of delivery:**

Contact teaching

**Learning activities and teaching methods:**

The English 2 course is tailored to the needs of students in different fields of study, and thus the materials and implementation methods of the course vary between groups. The teacher will provide a more detailed schedule and list of homework tasks. There will be 26 hours of guided teaching events and 28 hours of independent work, including both individual and group work.

Individual learning methods: autonomous learning tasks, practice in lecture listening and written tasks in preparation for classroom lessons

Group work: Preparation of presentations in groups

**Target group:**

2<sup>nd</sup> year students of Biology, Chemistry, Geoscience

1<sup>st</sup> year students of Mathematical and Physical Sciences (new programme)

**Prerequisites and co-requisites:**

Pre-requisite course: [902002Y Englannin kieli 1](#)

**Recommended optional programme components:**

-

**Recommended or required reading:**

**Assessment methods and criteria:**

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

The assessment of the course is based on the learning outcomes of the course.

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

**Grading:**

Pass / fail.

**Person responsible:**

Karen Niskanen

**Working life cooperation:**

-

**Other information:**

-

**750032Y: Orientation course for new students, 2 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** General Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Annamari Markkola, Vanhatalo, Minna-Liisa

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

750031Y Orientation course for new students 1.0 op

**ECTS Credits:**

2 ECTS credits / 53 hours of work.

**Language of instruction:**

Finnish.

**Timing:**

B.Sc. 1 st 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 (PSP) for the first study year.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

Tutorials, presentations, seminar of major subjects, computer exercises, independent studying, total 53 h.

**Target group:**

BIOL: compulsory.

**Prerequisites and co-requisites:**

No.

**Recommended optional programme components:**

-

**Recommended or required reading:**

Study syllabus.

**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:**

N.N. and 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

**750124P: Basics of ecology, 5 op****Opiskelumuoto:** Basic 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. 1<sup>st</sup> 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. Moodle excersises.

**Learning activities and teaching methods:**

The course is based on the course book Manuel C. Molles Jr. & Anna A. Sher 2018. Ecology: concepts and applications (8. ed), lectures describing the major sections of the book, and the Moodle exercises based on the book. After each lecture, a new Moodle-exercise will open (in ca. 2 week-intervals). Assessment is based on the success in the Moodle-exercises. There is no final exam in the course.

**Target group:**

Compulsory biology students.

**Prerequisites and co-requisites:**

No.

**Recommended optional programme components:**

-

**Recommended or required reading:**

Manuel C. Molles Jr. & Anna A. Sher 2018. Ecology: concepts and applications (8. p).

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

**Assessment methods and criteria:**

Passing the course demands passing all the Moodle-exercises in the given time. Assessment is based on the success in the Moodle-exercises.

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:**

-

## 750173P: Biogeography, 5 op

**Voimassaolo:** 01.08.2019 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Kvist, Laura Irmeli

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

750373A Biogeography 5.0 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. The student will have an understanding also of how human impact changes distributions and how the Finnish biota has been formed.

**Contents:**

The course introduces basic models and theories of distribution of organisms in the environment, offering historical, evolutionary, geographical, climatic and ecological explanations. It also

introduces research methods used in biogeography and offers understanding on human impact on distributions and a special part of distributions of biota in Finland.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

34 h lectures, independent work (3 cr, a learning diary), exam.

**Target group:**

BSc: 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) and Evolution, systematics and morphology of organisms, practicals (750374A)

**Recommended or required reading:**

Cox, C.B. & Moore, P.D. 2005: Biogeography. An ecological and evolutionary approach (7 ed.), Blackwell Publishing Ltd, tai Cox, C.B. & Moore, P.D. 2010: Biogeography. An ecological and evolutionary approach (8 ed.), John Wiley & Sons Inc. Eurola, S. 1999: Kasvipeitteemme alueellisuus. Oulanka Reports. Oulu. 116 s.

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

**Assessment methods and criteria:**

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.

**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, Jaana Jurvansuu

**Opintokohteen oppimateriaali:**

**Heino, Jyrki (2)** , , 2004

**Alberts, B. ym.** , , 2008

**Lodish et al.** , , 2003

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

5 ECTS credits / 133 hours of work.

**Language of instruction:**

Finnish.

**Timing:**

B.Sc. 1<sup>st</sup> autumn.

**Learning outcomes:**

The student is familiar with cellular structure and functions of 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, and understands the material basis and mechanisms of this continuity.

**Contents:**

The course is divided into three sections: genetics, animal cell biology, and plant cell biology. The course covers the structural and functional characteristics of plant and animal cells as well as the genetic basis of life (nucleic acids and inheritance, mitosis, meiosis, and gene expression).

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

38 h lectures, 97 h independent work, and home assignments.

**Target group:**

Compulsory to the biology and biochemistry students.

**Prerequisites and co-requisites:**

Good knowledge of upper elementary school biology and chemistry.

**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 Reece ym. 2014: Campbell et al. 2018. Biology: A Global Approach (10e), Pearson, 1350 s. 978-1-292-00865-3, Alberts, B. ym. 2015: Molecular Biology of the Cell (6e), Garland Science Publishing, London, 1464 s. ISBN: 9780815345244, Heino J. & Vuento M. 2014: Biokemian ja solubiologian perusteet (3. painos) WSOY Pro Oy, Helsinki, Jones R. ym. 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. Each lecture section has a separate exam, which all have to be passed to do the course (no credits to Oodi are given before all three exams are passed). No final exam. The exams have to be done within one academic year.

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 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:** Heikki Helanterä

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

757122P Concepts of genetics for biochemists 3.0 op

753124P General genetics 4.0 op

**ECTS Credits:**

5 ECTS credits / 133 hours of work.

**Language of instruction:**

Finnish.

**Timing:**

B.Sc. 1st 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 (11. 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:**

Ass. Prof. Heikki Helanterä.

**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:** Lumi Viljakainen

**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, 1st spring.

**Learning outcomes:**

Knowledge on essential phenomena in genetics as well as know-how to work in a genetics laboratory. Student understands and is able to apply and analyse fundamental genetical experiments.

**Contents:**

Investigation of Mendelian inheritance; gene mapping and nonadditive effects of genes using cross-breeding; basics of population genetics; investigation of mitosis and meiosis using cytogenetical methods.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

14 h demonstrations, 30 h exercises, 82 h independent work including home work and 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:**

Exam, report, participation to exercises.

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:**

-

**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. 3rd autumn.

**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:**

24 h lectures, 25 h exercises and independent studying, mid-semester exams.

**Learning activities and teaching methods:**

Face-to-face teaching.

**Target group:**

BS compulsory, TEA and ECO optional.

**Prerequisites and co-requisites:**

Cell biology (750121P) or equivalent knowledge.

**Recommended optional programme components:**

-

**Recommended or required reading:**

Reece, J.B. Urry, L.A. Cain, M.L., Wasserman, S.A. Minorsky, P.V. & Jackson R.B. 2013: Campbell Biology (10e). Pearson, Global Edition, 1488 p, handouts.

**Assessment methods and criteria:**

Lecture exam 1-5 / Fail.

Exercises as accepted / Fail by learning diary / blog.

**Grading:**

1-5 / Fail.

**Person responsible:**

Sanni Kinnunen.

**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. 3<sup>rd</sup> 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:**

Independent studying: book exam.

**Learning activities and teaching methods:**

Students make workshops where they discuss content of the books. Book exam (3 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:**

**BSg**

- Klug, W. S., Cummings, M. R., Spencer, C.A ja Palladino M.A.: Concepts of Genetics (11. ed.). Pearson & Prentice Hall, 2015  
Choose one option:
  - Molecular genetics: chapters 1-3, 6, 8-22, 24 OR
  - Population and Evolutionary Genetics: chapters 1, 3-6, 10-18, 20-23, 25.
- responsible teacher doc. Heikki Helanterä

**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 doc. Kari Koivula

### 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 doc. Annamari Markkola

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:

Doc. Heikki Helanterä, Prof. Hely Häggman, Doc. Annamari Markkola and Doc. Kari Koivula.

#### 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 accepts it. 3 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. Timo Muotka or Dr. Heikki Helanterä.

**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

**Opettajat:** Seppo Rytönen

**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: 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.

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

**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 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 coordinator, computer classes, peer groups Prof. Timo Muotka

*B.Sc. thesis:* Prof. Timo Muotka, Dr. Heikki Helanterä and Prof. Hely Häggman.

**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:** Annamari Markkola, Marko Mutanen

**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:**

Doc. Annamari Markkola, Doc. Risto Virtanen and Doc. Marko Mutanen.

**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:** Panu Välimäki

**Opintokohteen oppimateriaali:**

**Björklund, Mats**, , 2009

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

5 ECTS credits / 133 hours of work.

**Language of instruction:**

Finnish / (English).

**Timing:**

B.Sc. degree 2<sup>nd</sup> 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 to the main topics of evolutionary ecology, for example basic concepts of natural selection and evolution, selection level, speciation, evolution of life histories, also 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. Lectures and seminars compulsory, exam.

**Target group:**

BS and ECO compulsory, TEAeco optional.

**Prerequisites and co-requisites:**

No.

**Recommended optional programme components:**

-

**Recommended or required reading:**

Lectures and seminars.

**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 and Dr. Panu Välimäki.

**Working life cooperation:**

No.

**Other information:**

Gaudeamus, Stearns, S. and Hoekstra, R. F. 2005: Evolution, An Introduction. Oxford University Press, New York, 575 p

## **755335A: Identification of animals, invertebrates, 4 op**

**Voimassaolo:** 01.08.2019 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Kari Koivula

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

4 ECTS credits / 106 hours of work.

**Language of instruction:**

Finnish / English.

**Timing:**

B.Sc. 1st spring.

**Learning outcomes:**

Main point of the course is to learn to identify Finnish invertebrate species at the family level from museum samples. Basics of species' ecology and classification of organisms.

**Contents:**

During 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:**

9 h lectures in Finnish, 16 h exercises, self-learning, exam.

**Target group:**

ECOGEN.

**Prerequisites and co-requisites:**

No.

**Recommended optional programme components:**

This course is needed for attending courses Terrestrial animals field course (755322A) and Aquatic ecology field course (755321A).

**Recommended or required reading:**

Check course wiki pages.

**Assessment methods and criteria:**

Species 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:**

-

**755334A: Identification of animals, vertebrates, 4 op**

**Voimassaolo:** 01.08.2019 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Kari Koivula

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

755333A Identification of animals 6.0 op

**ECTS Credits:**

4 ECTS credits / 106 hours of work.

**Language of instruction:**

Finnish / English.

**Timing:**

B.Sc. 1st autumn.

**Learning outcomes:**

Main goal is to learn to identify Finnish animal species (vertebrate) from museum samples.

**Contents:**

During the autumn semester (9 h lectures in Finnish, 16 h exercises based on museum samples, exam).

**Mode of delivery:**

Face-to-face teaching.



**Learning activities and teaching methods:**

14 h lectures in Finnish, 14 h exercises, one exercise group with English lectures, self-learning, exam.

**Target group:**

ECOGEN.

**Prerequisites and co-requisites:**

No.

**Recommended optional programme components:**

This course is needed for attending courses Terrestrial animals field course (755322A) and Aquatic ecology field course (755321A).

**Recommended or required reading:**

Check course Moodle pages.

**Assessment methods and criteria:**

Species 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:**

-

**756355A: Identification of plant species, brief, 3 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Annamari Markkola

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

756342A Identification of plant species 3.0 op

**ECTS Credits:**

3 ECTS credits / 80 hours of work.

**Language of instruction:**

Finnish / English.

**Timing:**

BSc 1st autumn.

**Learning outcomes:**

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

**Contents:**

Demonstrations and/or independent stud of ca. 350 vascular plants, mosses and lichens in the boreal vegetation zone. 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. 350 plant species. In the identification exam student has to know specimens scientific name and family in latin.

**Target group:**

BSc degree, BS: compulsory 3 cr.

**Prerequisites and co-requisites:**

No.

**Recommended optional programme components:**

-

**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:**

Two species identification subexams (756355A-01 and 756355A-02) 3 cr with the help of 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:**

-

**757312A: Molecular evolution, 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:**

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 take an exam based on literature.

**Timing:**

B.Sc. 2nd autumn.

**Learning outcomes:**

Methods to study the evolutionary history of organisms and the evolutionary forces that have affected the outcome. The student knows the main concepts in the field and can read scientific articles in molecular evolution.

**Contents:**

Methods to estimate nucleotide substitution rates, reconstruction of phylogenetic trees with distance based methods and parsimony. Evolution of genome structure and size.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

24 h lectures, 16 h exercises/seminar, 90 h independent studies including home essays.

**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:**

Graur, D, Molecular and Genome evolution 2016. Sinauer, Massachusetts, Graur, D. ja 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:**

Homework, Exam/essay, exercises.

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:**

-

**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.

**Recommended optional programme components:**

This course is a prerequisite for course Plant biology practicals (756341A) and Biotechnology and Molecular Biology of Plants (751688S).

**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:**

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**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:**

English.

**Timing:**

B.Sc. studies, 3rd autumn.

**Learning outcomes:**

After the course the student can explain and is able to use the basic methods to analyse nucleotide and protein sequences. Student learns how to use various databases, can explain the 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, 6 h seminar, 20 h exercises, independent work.

**Target group:**

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

**Prerequisites and co-requisites:**

Concepts of genetics (757109P) or equivalent knowledge, also Molecular evolution (757312A) 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:**

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

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Sanni Kinnunen

**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. 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:**

“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 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.

**Mode of delivery:**

Distance learning, in Moodle.

**Learning activities and teaching methods:**

Lecture videos, exercises, virtual microscopic preparates, independent working on virtual microscope, identification of different tissue types on histologic preparates.

**Target group:**

Compulsory to BS students. Optional to ECO and TEA.

**Prerequisites and co-requisites:**

Cell biology (750121P) or equivalent knowledge.

**Recommended optional programme components:**

-

**Recommended or required reading:**

video lecture, material in Moodle, Recommended reading: Scott Gilbert, Developmental Biology 10<sup>th</sup> ed, Sinauer Associates.Inc.U.S. (or older), 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:**

1 exam in developmental biology, 4-5 exams in histology.

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

**Grading:**

1-5 / Fail.

**Person responsible:**

Dr. Sanni Kinnunen

**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:** Lumi Viljakainen

**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:**

Student can isolate DNA, estimate the quality and measure the quantity of DNA, amplify DNA fragments using polymerase chain reaction, design PCR primers, clone and sequence DNA. The student is able to evaluate the results and optimize the methods.

**Contents:**

Isolation of genomic DNA, amplification of DNA by PCR, primer design, DNA sequencing molecular cloning, analysis of DNA-sequence and writing scientific reports.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

48 h laboratory work including demonstrations, 50 h independent work including homework and writing report.

**Target group:**

Compulsory to BSc and ECOGEN, 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. Lumi Viljakainen.

**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 Biotechnology and Molecular Biology of Plants (751688S).

**Recommended or required reading:**

Terävä, E. & Kanervo, E. 2008: Kasvianatomia or equivalent knowledge, Taiz, L. et al. : Plant Physiology and Development (6. painos) Sinauer Associates, Sunderland Massachusetts U.S.A; 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:**

BS compulsory. ECO and TEA optional.

**Prerequisites and co-requisites:**

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

**Recommended optional programme components:**

-

**Recommended or required reading:**

Lectures and supplementary material. Taiz et al. 2015. Plant Physiology and Development (sixth edition) and 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:**

-

## 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:**

The course is held in the autumn semester, during period 1

**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:**

Minna Tiainen

**Working life cooperation:**

No

**030005P: Information Skills, 1 op**

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Technology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Ursula Heinikoski

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

030004P Introduction to Information Retrieval 0.0 op

**ECTS Credits:**

1 ECTS credits / 27 hours of work

**Language of instruction:**

Finnish

**Timing:**

Architecture 3. spring semester, period I; Biochemistry 3. autumn semester; Biology 3. autumn semester, period I; Chemistry 3. autumn semester, period II; Computer Science and Engineering 2. spring semester, period IV; Electronics and Communications Engineering 3. spring semester; Geosciences 2. spring semester, period IV; Geography 1. and 3. spring semester, period III; Industrial Engineering and Management 3. year (Master's degree students in Industrial Engineering and Management 1st year.); Information Processing Sciences 1. year; Mathematics and Physics 1. spring semester, period III; Mechanical Engineering 3. year; Mining Engineering and Mineral Processing 3. year; Process and Environmental Engineering 2. year, period II.

**Learning outcomes:**

Upon completion of the course, the students:

- can search scientific information,
- can use the most important databases of their discipline,
- know how to evaluate search results and information sources,
- can use the reference management tool

**Contents:**

Scientific information retrieval process, the most important databases and publication channels of the discipline, evaluation of the reliability of information sources and RefWorks reference management tool.

**Mode of delivery:**

Blended teaching: classroom training, web-based learning material and exercises, a group assignment.

**Learning activities and teaching methods:**

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

**Target group:**

Compulsory for all bachelor degree students of Faculty of Information Technology and Electrical Engineering, Faculty of Technology and Faculty of Science. Compulsory also for those Master's degree students in Industrial Engineering and Management who have no earlier studies in the information skills. Optional for the students of biochemistry.

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

Web learning material Tieteellisen tiedonhankinnan opas <http://libguides oulu.fi/tieteellintiedonhankinta> (in Finnish)

**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:**

Ursula Heinikoski

**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 spring

**Learning outcomes:**

After this course, the student:

- can recognize and name basic organic compounds and explain their properties.
- can explain organic chemistry basic concepts.
- can deduce basic reaction types and solve their mechanisms.

**Contents:**

Classification of organic compounds and their properties. Basic reactions of organic compounds: addition, elimination and substitution along with the reaction mechanisms. Basics of stereochemistry.

**Mode of delivery:**

Face-to-face teaching

**Learning activities and teaching methods:**

38 hours of lectures plus 12 hours of exercises, 84 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:**

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 Päckilä

**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 to A Second Course in Statistics.

**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:**

Hanna Heikkinen and Jari Päckilä

**Working life cooperation:**

No

**Other information:**

-

**750032Y: Orientation course for new students, 2 op****Voimassaolo:** 01.08.2017 -**Opiskelumuoto:** General Studies**Laji:** Course**Vastuuyksikkö:** Field of Biology**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Annamari Markkola, Vanhatalo, Minna-Liisa**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

750031Y Orientation course for new students 1.0 op

**ECTS Credits:**

2 ECTS credits / 53 hours of work.

**Language of instruction:**

Finnish.

**Timing:**

B.Sc. 1 st 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 (PSP) for the first study year.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

Tutorials, presentations, seminar of major subjects, computer exercises, independent studying, total 53 h.

**Target group:**

BIOL: compulsory.

**Prerequisites and co-requisites:**

No.

**Recommended optional programme components:**

-

**Recommended or required reading:**

Study syllabus.

**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:**

N.N. and Ph. Lic. Minna Vanhatalo.

**Working life cooperation:**

No.

**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 who choose English as their foreign language in the following B.Sc. degree programmes:

**Faculty of Natural Sciences**

- Biology
- Mathematical and Physical Sciences

**Faculty of Technology**

- Department of Chemistry

**Oulu Mining School**

- Geosciences degree programme

Please consult your faculty's 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 / 54 hours of work

**Language of instruction:**

English

**Timing:**

Biology: 1st year spring term (periods 3 and 4)

Mathematical and Physical Sciences: 1st year autumn term (periods 1 and 2)

Chemistry: 1st year autumn term (periods 1 and 2)

Geosciences: 1st year spring term (periods 3 and 4)

**Learning outcomes:**

By the end of the course, you are expected to

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

**Contents:**

The course will focus on reading strategies; these include recognising how texts are organised, 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 and independent study

**Learning activities and teaching methods:**

The English 1 course is adapted to accommodate many different fields of study, and thus the materials and implementation methods of the course vary. There will be 26 hours of guided teaching events and 28 hours of independent study, either individually or in a group. A more detailed course description and list of homework tasks will be provided by the teacher.

**Target group:**

**Faculty of Natural Sciences:** Biology, Mathematical & Physical Sciences

**Faculty of Technology:** Chemistry

**Oulu Mining School:** Geosciences

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

Students are also required to take [English 2 902004Y](#), or [English 4 902005Y](#), AFTER completion of this course.

**Recommended or required reading:**

Course materials will be provided in electronic form or will be accessible from the university library.

**Assessment methods and criteria:**

Student work is monitored by continuous assessment, and students are required to participate regularly and actively in all contact teaching provided. During the course, there will be three monthly tests on material covered so far. The assessment of the course is based on the learning outcomes listed above.

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. Please contact your own faculty for information.

## 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 [Common European Framework of Reference](#) scale.

**Status:**

This course is mandatory for students who choose English as their foreign language in the following B.Sc. degree programmes:

**Faculty of Natural Sciences:**

Biology

Mathematical & Physical Sciences

**Faculty of Technology:**

Chemistry

**Oulu Mining School:**

Geoscience degree programme

*Note: Information Processing Science students who began their studies in autumn 2017 or later will take [English 4](#) instead.*

Please consult your faculty's study guide to establish the language requirements of your own degree programme.

**Required proficiency level:**

Students taking this course must have had English as the A1 or A2 language at school or have equivalent skills. The course [English 1 \(902002Y\)](#) is a pre-requisite, unless exempted.

**ECTS Credits:**

2 ECTS credits / 54 hours work.

**Language of instruction:**

English

**Timing:**

Biology: 2nd year autumn term (periods 1 and 2)

Mathematic and Physical Sciences 1st year spring term (periods 3 and 4)

Chemistry: 2nd year spring term (periods 3 and 4)

Geosciences: 2nd year spring term (periods 3 and 4)

**Learning outcomes:**

By the end of the course, you are expected to have demonstrated the ability to:

- **use appropriate strategies and techniques for communicating effectively** in English in an academic context
- **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 is given to support the classroom learning.

**Mode of delivery:**

Contact teaching

**Learning activities and teaching methods:**

The English 2 course is tailored to the needs of students in different fields of study, and thus the materials and implementation methods of the course vary between groups. The teacher will provide a more detailed schedule and list of homework tasks. There will be 26 hours of guided teaching events and 28 hours of independent work, including both individual and group work.

Individual learning methods: autonomous learning tasks, practice in lecture listening and written tasks in preparation for classroom lessons

Group work: Preparation of presentations in groups

**Target group:**

2<sup>nd</sup> year students of Biology, Chemistry, Geoscience

1<sup>st</sup> year students of Mathematical and Physical Sciences (new programme)

**Prerequisites and co-requisites:**

Pre-requisite course: [902002Y Englannin kieli 1](#)

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

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

The assessment of the course is based on the learning outcomes of the course.

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

**Grading:**

Pass / fail.

**Person responsible:**

Karen Niskanen

**Working life cooperation:**

-

**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

## 750124P: Basics of ecology, 5 op

**Opiskelumuoto:** Basic 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. 1<sup>st</sup> 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. Moodle excersises.

**Learning activities and teaching methods:**

The course is based on the course book Manuel C. Molles Jr. & Anna A. Sher 2018. Ecology: concepts and applications (8. ed), lectures describing the major sections of the book, and the Moodle exercises based on the book. After each lecture, a new Moodle-exercise will open (in ca. 2 week-intervals). Assessment is based on the success in the Moodle-exercises. There is no final exam in the course.

**Target group:**

Compulsory biology students.

**Prerequisites and co-requisites:**

No.

**Recommended optional programme components:**

-

**Recommended or required reading:**

Manuel C. Molles Jr. & Anna A. Sher 2018. Ecology: concepts and applications (8. p).

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

**Assessment methods and criteria:**

Passing the course demands passing all the Moodle-exercises in the given time. Assessment is based on the success in the Moodle-exercises.

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:**

-

## 750173P: Biogeography, 5 op

**Voimassaolo:** 01.08.2019 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Kvist, Laura Irmeli

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

750373A Biogeography 5.0 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. The student will have an understanding also of how human impact changes distributions and how the Finnish biota has been formed.

**Contents:**

The course introduces basic models and theories of distribution of organisms in the environment, offering historical, evolutionary, geographical, climatic and ecological explanations. It also introduces research methods used in biogeography and offers understanding on human impact on distributions and a special part of distributions of biota in Finland.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

34 h lectures, independent work (3 cr, a learning diary), exam.

**Target group:**

BSc: 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) and Evolution, systematics and morphology of organisms, practicals (750374A)

**Recommended or required reading:**

Cox, C.B. & Moore, P.D. 2005: Biogeography. An ecological and evolutionary approach (7 ed.), Blackwell Publishing Ltd, tai Cox, C.B. & Moore, P.D. 2010: Biogeography. An ecological and evolutionary approach (8 ed.), John Wiley & Sons Inc. Euroala, S. 1999: Kasvipeitteemme alueellisuus. Oulanka Reports. Oulu. 116 s.

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

**Assessment methods and criteria:**

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.

**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, Jaana Jurvansuu

**Opintokohteen oppimateriaali:**

**Heino, Jyrki (2)** , , 2004

**Alberts, B. ym.**, , 2008

**Lodish et al.**, , 2003

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

5 ECTS credits / 133 hours of work.

**Language of instruction:**

Finnish.

**Timing:**

B.Sc. 1<sup>st</sup> autumn.

**Learning outcomes:**

The student is familiar with cellular structure and functions of 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, and understands the material basis and mechanisms of this continuity.

**Contents:**

The course is divided into three sections: genetics, animal cell biology, and plant cell biology. The course covers the structural and functional characteristics of plant and animal cells as well as the genetic basis of life (nucleic acids and inheritance, mitosis, meiosis, and gene expression).

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

38 h lectures, 97 h independent work, and home assignments.

**Target group:**

Compulsory to the biology and biochemistry students.

**Prerequisites and co-requisites:**

Good knowledge of upper elementary school biology and chemistry.

**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 Reece ym. 2014: Campbell et al. 2018. Biology: A Global Approach (10e), Pearson, 1350 s. 978-1-292-00865-3, Alberts, B. ym. 2015: Molecular Biology of the Cell (6e), Garland Science Publishing, London, 1464 s. ISBN: 9780815345244, Heino J. & Vuento M. 2014: Biokemian ja solubiologian perusteet (3. painos) WSOY Pro Oy, Helsinki, Jones R. ym. 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. Each lecture section has a separate exam, which all have to be passed to do the course (no credits to Oodi are given before all three exams are passed). No final exam. The exams have to be done within one academic year.

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 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:** Heikki Helanterä**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

757122P Concepts of genetics for biochemists 3.0 op

753124P General genetics 4.0 op

**ECTS Credits:**

5 ECTS credits / 133 hours of work.

**Language of instruction:**

Finnish.

**Timing:**

B.Sc. 1st 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 (11. 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:**

Ass. Prof. Heikki Helanterä.

**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:** Lumi Viljakainen

**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, 1st spring.

**Learning outcomes:**

Knowledge on essential phenomena in genetics as well as know-how to work in a genetics laboratory. Student understands and is able to apply and analyse fundamental genetical experiments.

**Contents:**

Investigation of Mendelian inheritance; gene mapping and nonadditive effects of genes using cross-breeding; basics of population genetics; investigation of mitosis and meiosis using cytogenetical methods.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

14 h demonstrations, 30 h exercises, 82 h independent work including home work and 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:**

Exam, report, participation to exercises.

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:**

-

## 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. 3<sup>rd</sup> 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:**

Independent studying: book exam.

**Learning activities and teaching methods:**

Students make workshops where they discuss content of the books. Book exam (3 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:**

**BSg**

- Klug, W. S., Cummings, M. R., Spencer, C.A ja Palladino M.A.: Concepts of Genetics (11. ed.). Pearson & Prentice Hall, 2015  
Choose one option:
  - Molecular genetics: chapters 1-3, 6, 8-22, 24 OR
  - Population and Evolutionary Genetics: chapters 1, 3-6, 10-18, 20-23, 25.
- responsible teacher doc. Heikki Helanterä

**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 Scriming 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 doc. Kari Koivula

**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 doc. Annamari Markkola

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:**

Doc. Heikki Helanterä, Prof. Hely Häggman, Doc. Annamari Markkola and Doc. Kari Koivula.

**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 accepts it. 3 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. Timo Muotka or Dr. Heikki Helanterä.

**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

**Opettajat:** Seppo Rytkönen

**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: 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.

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

**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 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 coordinator, computer classes, peer groups Prof. Timo Muotka  
*B.Sc. thesis:* Prof. Timo Muotka, Dr. Heikki Helanterä and Prof. Hely Häggman.

**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:** Annamari Markkola, Marko Mutanen

**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:**

Doc. Annamari Markkola, Doc. Risto Virtanen and Doc. Marko Mutanen.

**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:** Panu Välimäki

**Opintokohteen oppimateriaali:**

**Björklund, Mats**, , 2009

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

5 ECTS credits / 133 hours of work.

**Language of instruction:**

Finnish / (English).

**Timing:**

B.Sc. degree 2<sup>nd</sup> 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 to the main topics of evolutionary ecology, for example basic concepts of natural selection and evolution, selection level, speciation, evolution of life histories, also 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. Lectures and seminars compulsory, exam.

**Target group:**

BS and ECO compulsory, TEAeco optional.

**Prerequisites and co-requisites:**

No.

**Recommended optional programme components:**

-

**Recommended or required reading:**

Lectures and seminars.

**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 and Dr. Panu Välimäki.

**Working life cooperation:**

No.

**Other information:**

Gaudeamus, Stearns, S. and Hoekstra, R. F. 2005: Evolution, An Introduction. Oxford University Press, New York, 575 p

## 755335A: Identification of animals, invertebrates, 4 op

**Voimassaolo:** 01.08.2019 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Kari Koivula

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

4 ECTS credits / 106 hours of work.

**Language of instruction:**

Finnish / English.

**Timing:**

B.Sc. 1st spring.

**Learning outcomes:**

Main point of the course is to learn to identify Finnish invertebrate species at the family level from museum samples. Basics of species' ecology and classification of organisms.

**Contents:**

During 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:**

9 h lectures in Finnish, 16 h exercises, self-learning, exam.

**Target group:**

ECOGEN.

**Prerequisites and co-requisites:**

No.

**Recommended optional programme components:**

This course is needed for attending courses Terrestrial animals field course (755322A) and Aquatic ecology field course (755321A).

**Recommended or required reading:**

Check course wiki pages.

**Assessment methods and criteria:**

Species 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:**

-

## 755334A: Identification of animals, vertebrates, 4 op

**Voimassaolo:** 01.08.2019 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Kari Koivula

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

755333A Identification of animals 6.0 op

**ECTS Credits:**

4 ECTS credits / 106 hours of work.

**Language of instruction:**

Finnish / English.

**Timing:**

B.Sc. 1st autumn.

**Learning outcomes:**

Main goal is to learn to identify Finnish animal species (vertebrate) from museum samples.

**Contents:**

During the autumn semester (9 h lectures in Finnish, 16 h exercises based on museum samples, exam).

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

14 h lectures in Finnish, 14 h exercises, one exercise group with English lectures, self-learning, exam.

**Target group:**

ECOGEN.

**Prerequisites and co-requisites:**

No.

**Recommended optional programme components:**

This course is needed for attending courses Terrestrial animals field course (755322A) and Aquatic ecology field course (755321A).

**Recommended or required reading:**

Check course Moodle pages.

**Assessment methods and criteria:**

Species 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:**

## 756354A: Identification of plant species, extensive, 5 op

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Annamari Markkola

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

5 ECTS credits / 133 hours of work.

**Language of instruction:**

Finnish / English.

**Timing:**

BSc 1st autumn.

**Learning outcomes:**

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

**Contents:**

Demonstrations and/or independent stud of ca. 350 vascular plants, mosses and lichens in the boreal vegetation zone. 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. 350 plant species. In the identification exam student has to know specimens scientific name and family in latin.

**Target group:**

BSc degree: ECO and TEA 5 cr compulsory.

**Prerequisites and co-requisites:**

No.

**Recommended optional programme components:**

Course done as 5 cr (756654S) is prerequisite for the Plant ecology field course (756643S) and for the advanced plant species identification courses (752608S and 752625S).

**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:**

Two species identification subexams (756354A-01 and 756354A-02). 5 cr without the course 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:**

-

## 757312A: Molecular evolution, 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:**

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 take an exam based on literature.

**Timing:**

B.Sc. 2nd autumn.

**Learning outcomes:**

Methods to study the evolutionary history of organisms and the evolutionary forces that have affected the outcome. The student knows the main concepts in the field and can read scientific articles in molecular evolution.

**Contents:**

Methods to estimate nucleotide substitution rates, reconstruction of phylogenetic trees with distance based methods and parsimony. Evolution of genome structure and size.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

24 h lectures, 16 h exercises/seminar, 90 h independent studies including home essays.

**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:**

Graur, D, Molecular and Genome evolution 2016. Sinauer, Massachusetts, Graur, D. ja 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:**

Homework, Exam/essay, exercises.

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:**

-

## 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.

**Recommended optional programme components:**

This course is a prerequisite for course Plant biology practicals (756341A) and Biotechnology and Molecular Biology of Plants (751688S).

**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: Aquatic ecology field course, 5 op**

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**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 Aquatic ecology field course 5 cr (755321A) or Terrestrial animals field course 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 Aquatic ecology field course 5 cr or Terrestrial animals field course 5 cr. TEA: at least 10 cr compulsory, two field courses, one animal and other Plant ecology field course (756343A).

**Prerequisites and co-requisites:**

Identification of animals, vertebrates 4 cr (755334A) and Identification of animals, invertebrates 4 cr (755335A) or equivalent knowledge. (if necessary, selection to the course 755321A can be based on success in courses 755334A and 755335A).

**Recommended optional programme components:**

This course is a prerequisite for the following: Winter ecology (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:**

-

## 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:** Seppo Rytönen, 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 recognize scientific information from pseudo-scientific and other descriptions and explanations of surrounding world. Students have learned to assess the uncertainty of information and can also evaluate the quality of information with respect to its theoretical and 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:**

See 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. Kari Koivula and Doc. Seppo Rytönen.

**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 Rytönen

**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 Doc. Kari Koivula.

**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:** Annamari Markkola, Kari Taulavuori

**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) Book exam. (2) 22 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 Plant ecology field course (756343A) or equivalent knowledge.

**Recommended optional programme components:**

-

**Recommended or required reading:**

Ridge, I. 2002: Plants, Oxford Univ. Press..

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

**Assessment methods and criteria:**

Lecture Book exam (final grade), laboratory diary and seminar presentation (both accepted/rejected).

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:**

-

**756343A: Plant ecology field course, 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:**

-

**755336A: Population ecology, 10 op**

**Voimassaolo:** 01.08.2019 - 31.07.2020

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Kvist, Laura Irmeli

**Opintokohteen kielet:** English

**Leikkaavuudet:**

756351A Introduction to population ecology 5.0 op

754628S Stream ecology 5.0 op

**ECTS Credits:**

10 ECTS credits / 266 hours of work + optional 5 ECTS.

**Language of instruction:**

English.

**Timing:**

B.Sc. 3rd autumn - spring.

**Learning outcomes:**

Basic skills in methods of population biology. Student learns basic on theory and application of population ecology methodologies.

**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 and mark-recapture 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, mark-recapture models and simulation programs. In addition, the student can take an optional field course part for collecting and analyzing population ecological data.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

36 h lectures, 50 h computer exercises, seminar and an optional field course with a report.

**Target group:**

ECO: BSc compulsory. ECOGEN eco: MSc compulsory.

**Prerequisites and co-requisites:**

Basics of ecology (750124P) or equivalent knowledge.

**Recommended optional programme components:**

-

**Recommended or required reading:**

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

Two exams. A report of the optional part.

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

**Grading:**

1-5 / Fail.

**Person responsible:**

Doc. Laura Kvist.

**Working life cooperation:**

No.

**Other information:**

-

## 755322A: Terrestrial animals field course, 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:**

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 Aquatic ecology field course 5 cr (755321A) or Terrestrial animals field course 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 Aquatic ecology field course 5 cr or Terrestrial animals field course 5 cr. TEA: at least 10 cr compulsory, two field courses, one animal and other Plant ecology field course (756343A).

**Prerequisites and co-requisites:**

Identification of animals, vertebrates 4 cr (755334A) and Identification of animals, invertebrates 4 cr (755335A) or equivalent knowledge.

**Recommended optional programme components:**

This course is a prerequisite to course Winter ecology (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 määrittämysopas, 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.

## 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:**

The course is held in the autumn semester, during period 1

**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:**

Minna Tiainen

**Working life cooperation:**

No

## 030005P: Information Skills, 1 op

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Technology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Ursula Heinikoski

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

030004P Introduction to Information Retrieval 0.0 op

**ECTS Credits:**

1 ECTS credits / 27 hours of work

**Language of instruction:**

Finnish

**Timing:**

Architecture 3. spring semester, period I; Biochemistry 3. autumn semester; Biology 3. autumn semester, period I; Chemistry 3. autumn semester, period II; Computer Science and Engineering 2. spring semester, period IV; Electronics and Communications Engineering 3. spring semester; Geosciences 2. spring semester, period IV; Geography 1. and 3. spring semester, period III; Industrial Engineering and Management 3. year (Master's degree students in Industrial Engineering and Management 1st year.); Information Processing Sciences 1. year; Mathematics and Physics 1. spring semester, period III; Mechanical Engineering 3. year; Mining Engineering and Mineral Processing 3. year; Process and Environmental Engineering 2. year, period II.

**Learning outcomes:**

Upon completion of the course, the students:

- can search scientific information,
- can use the most important databases of their discipline,
- know how to evaluate search results and information sources,
- can use the reference management tool

**Contents:**

Scientific information retrieval process, the most important databases and publication channels of the discipline, evaluation of the reliability of information sources and RefWorks reference management tool.

**Mode of delivery:**

Blended teaching: classroom training, web-based learning material and exercises, a group assignment.

**Learning activities and teaching methods:**

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

**Target group:**

Compulsory for all bachelor degree students of Faculty of Information Technology and Electrical Engineering, Faculty of Technology and Faculty of Science. Compulsory also for those Master's degree students in Industrial Engineering and Management who have no earlier studies in the information skills. Optional for the students of biochemistry.

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

Web learning material Tieteellisen tiedonhankinnan opas <http://libguides oulu.fi/tieteellinentiedonhankinta> (in Finnish)

**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:**

Ursula Heinikoski

**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 to A Second Course in Statistics.

**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:**

Hanna Heikkinen and Jari Pääkkilä

**Working life cooperation:**

No

**Other information:**

-

## **750032Y: Orientation course for new students, 2 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** General Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail



**Opettajat:** Annamari Markkola, Vanhatalo, Minna-Liisa

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

750031Y Orientation course for new students 1.0 op

**ECTS Credits:**

2 ECTS credits / 53 hours of work.

**Language of instruction:**

Finnish.

**Timing:**

B.Sc. 1 st 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 (PSP) for the first study year.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

Tutorials, presentations, seminar of major subjects, computer exercises, independent studying, total 53 h.

**Target group:**

BIOL: compulsory.

**Prerequisites and co-requisites:**

No.

**Recommended optional programme components:**

-

**Recommended or required reading:**

Study syllabus.

**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:**

N.N. and 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 - 40 ECTS credits / 267-533 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.

Didactics thesis will be 30-40 pages long (20 cr.) because the structure diverges from the biology thesis. In educational sciences concepts and methods is described wider than in science.

The M.Sc. maturity exam will be the abstract that the student will load to the Laturi system with the M.Sc. thesis. 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. Credits gained is determined as follows: mere quantitative content assessment = 20 cr.. Both quantitative and qualitative content assessment = 40 cr. The credit amount is defined when the student will fill the registration form for pro gradu thesis. This is done before the student will start the actual work.

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

**Grading:**

1-5 / Fail.

**Person responsible:**

Ass. Prof. Heikki Helanterä, Prof. Hely Häggman or Prof. Timo Muotka.

**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

**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:**

Itsenäinen opiskelu: kirjatentti.

**Learning activities and teaching methods:**

Book exam (3 h). Exam is held in Examinarium, instructions: <https://www oulu.fi/forstudents/e-exam>

**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. Timo Muotka):**

- 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 (Annamari Markkola):**

- 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 proferssor

**MAJOR BIOSCIENCE****Genetics orientation (Heikki Helanterä):**

- 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.

**Plant physiologi orientation (prof. Hely Häggman)**

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

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

**Assessment methods and criteria:**

Book exam in biology public exam day.

Exam in Examinarium: <http://www oulu.fi/english/studying/examinarium>

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

**Grading:**

1-5 / Fail.

**Person responsible:**

Dr. Heikki Helanterä, Prof. Hely Häggman, Doc. Annamari Markkola or Prof. Timo Muotka.

**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

**Opettajat:** Kari Koivula, Muotka, Timo Tapani

**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. Timo Muotka.

**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 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. Timo Muotka, Doc. Annamari Markkola and Dr. Heikki Helanerä.

**Working life cooperation:**

No.

**Other information:**

-

**H251104: Pedagogical Studies in Master's Degree, 30 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Study module

**Vastuuyksikkö:** Faculty of Education

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

*Compulsory*

**410087P: Sociocultural Contexts of Education, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Education

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Vesa Puuronen

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay410087P Sociocultural Contexts of Education (OPEN UNI) 5.0 op

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 ECTS

**Language of instruction:**

Finnish. English for the ITE students.

**Timing:**

1st year

**Learning outcomes:**

After completion the student is able

- to use the central concepts of social sciences in educational research and analyze the related basic issues in various contexts of education and growth
- to apply social, multicultural and juridical issues related to education and schooling in everyday life situations
- to describe the historical, socio-political and professional starting points of Finnish education system and educational politics

**Contents:**

Contents

- The basics of social sciences in educational research
- The possibilities and limitations of education and growth determined by the context, i.e. culture, society and environment
- The social, multicultural and juridical issues related to education
- Education systems as part of the historical development of society
- Education politics as a part of social politics

**Mode of delivery:**

Face-to-face teaching / blended teaching and learning

**Learning activities and teaching methods:**

Basic part 3 ECTS: Lectures for all 14 h, independent working 67 h

The basic part is composed of studying pre-given material, expert lectures (possibly by guest lecturers), and learning task. In addition, the adoption of learning outcomes are measured by separate assignment (e.g. examination or essay).

Seminar part 2 ECTS: Contact teaching in small study programme groups 10 h, independent working 44 h

The assignment can be for instance learning portfolio, which combines the contents of basic part and student's own life-world experiences.

**Target group:**

Students in all study programmes of Faculty of Education

**Prerequisites and co-requisites:**

No

**Recommended optional programme components:**

The course is part of the Basic Studies in Education (25 ECTS)

**Recommended or required reading:**

(in applicable parts; to be negotiated with instructor):

- Arum, R., Beattie, I. R. & Ford, K. (Eds.). (2011). *The Structure of schooling: Readings in the sociology of education*. Los Angeles: SAGE.
- Ballantine, J. H. & Spade, J. Z. (Eds.). (2012). *Schools and society: A sociological approach to education*. Los Angeles: SAGE.
- Demaine, J. (Ed.). (2001). *Sociology of education today*. London: Palgrave.
- Simola, H. (Ed.). (2014). *Finnish education mystery: Historical and sociological essays on schooling in Finland*. London: Routledge.
- Verdugo, R. R. (Ed.). (2014). *Educational reform in Europe: History, culture, and ideology*. Information Age Publishing.

- Original text from one of these theorists: Louis Althusser, Basil Bernstein, Pierre Bourdieu, Michel Foucault, Henry Giroux, Jürgen Habermas, Axel Honneth, Peter Jarvis, Peter McLaren, Paul Willis, or Thomas Ziehe.

**Assessment methods and criteria:**

Basic part 3 ECTS.

Assessment method: Both learning task and examination or essay based on the learning material and lectures.

Seminar part 2 ECTS.

Assessment method: Learning portfolio in study group working

The assessment criteria are weighted in the following way:

- first learning outcome is highlighted in learning task (Basic part)
- all three learning outcomes are highlighted in examination or essay (Basic part)
- third learning outcome is highlighted in portfolio (Seminar part)

In approved (Pass) completion of the course, the use of central concepts of social sciences in educational research and analytical handling of basic issues in various contexts of education and growth is clearly structured, and matters are connected to each other at least to some degree. The handling of social, multicultural and juridical issues related to education and schooling in everyday life situations is reflective, and connections between matters are handled at least to some degree. In addition, the description of the historical, socio-political and professional starting points of Finnish education system and educational politics is clear and appropriate. In all assignments, there has to be a visible plot and mainly the use of references has to be at a good level.

In not approved (Fail) completion of the course, student's study products are unfinished, fragmentary and superficial, matters are presented in disconnected way, or the presentation does not show own thinking nor acquisition to the core themes of the course. Study material is not utilized sufficiently, and references are weakly used.

**Grading:**

pass/fail

**Person responsible:**

Vesa Puuronen (Veli-Matti Ulvinen)

**Working life cooperation:**

The seminar part contains working life cooperation.

**410088P: Philosophical and Ethical Foundations and Objectives of Education, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Education

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Eetu Pikkarainen

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay410088P Philosophical and Ethical Foundations and Objectives of Education (OPEN UNI) 5.0  
op

**ECTS Credits:**

5 ECTS

**Language of instruction:**

Finnish. For ITE students: English

**Timing:**

1st year

**Learning outcomes:**

- Summarize and contrast central concepts and approaches of educational philosophy
- Compare international perspectives on ethics
- Apply concepts related to philosophy and ethics to discuss educational tasks and relationships in global contexts
- Describe their current educational philosophy and explain and illustrate their approach to professional ethics

**Contents:**

- Western and non-western schools of educational philosophy
- Perspectives on global and professional ethics
- Educational implications of different approaches
- Ethical dilemmas in educational contexts

**Mode of delivery:**

Blended teaching

**Learning activities and teaching methods:**

Lectures 20h, seminars 10h, and independent study 105h

**Target group:**

ITE, LO, Taika, Tekno, Vaka, Kako, AO, Avoin, AMOK

**Prerequisites and co-requisites:**

No

**Recommended optional programme components:**

The course is part of Basic Studies in Education

**Recommended or required reading:**

- Freire, P. (1998). Pedagogy of Freedom: Ethics, Democracy, and Civic Courage. Oxford: Rowman & Littlefield Publishers.
- Noddings, N. (2005). Challenge to care in Schools. 2 nd ed. New York: Teachers' College Press.

**Assessment methods and criteria:**

Active participation,  
Essay

**Grading:**

Pass/Fail

**Person responsible:**

Jouni Peltonen, Eetu Pikkarainen

**Working life cooperation:**

Seminar phase of the course work includes observation task on field.

**050123A: Research-Based Subject Didactics, 10 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Education

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

10 ECTS

**Language of instruction:**

Finnish

**Timing:**

4. year autumn, 1. period



**Learning outcomes:**

The student knows how to

- describe the starting-points of educational research and explain the basics of qualitative and quantitative research.
- make use of didactic research in his/her own subject and compose a thesis in subject didactics.
- choose a relevant research method for his/her study and analyze the research data.
- assess the significance of research in subject didactics for the teaching of his/her own subject and construct the thinking of an inquiring teacher.
- apply the knowledge acquired in the study related to subject didactics in supervised teaching practice.

**Contents:**

Planning and implementation of and reporting on a study in subject didactics. The study can be about

- a teaching experiment
- a study related to the curriculum
- research into knowledge of subject contents
- research on learning materials
- research of learning environments and use of new technologies in teaching
- research on attitudes
- research on hobby activities connected with the subject
- research on assessment methods

The study can be related to primary, secondary or tertiary education. The study can also be involved with the third sector.

Supervised teaching practice involves

- planning and implementation of lessons and blocks of teaching making use of knowledge acquired in studies on subject didactics.
- observation of lessons from the viewpoint of subject didactics

**Mode of delivery:**

Face-to-face teaching, supervised teaching practices in grades 7-9 and in the upper secondary grades of the Oulu Teacher Training School, the Faculty

**Learning activities and teaching methods:**

Lectures 8h, methodological exercises and seminar work, a maximum of 42h, and independent work 195h, including the production of a seminar thesis, preparation to act as opponent to another thesis, and familiarization with the other theses.

In supervised teaching practice, 1 credit equals 27 lessons (45 min each) = 16–17 lessons (75 min each).

- lessons to be given: 2–3 (75 min each)
- lessons to be monitored: 3 (75 min)
- independent work

**Target group:**

Students in the secondary teacher education programme

**Prerequisites and co-requisites:****Recommended optional programme components:**

The study module is part of the pedagogical studies in secondary teacher education

**Recommended or required reading:**

Curricula in the Oulu Teacher Training School and the literature to be agreed on at the start of the study module

**Assessment methods and criteria:**

Active participation in teaching, completion of independent assignments, conducting, and acting as an opponent to, a scientific study. Active and committed involvement in supervised teaching practice and related activities.

Pass

The student's performance shows accomplishment in line with the expected learning outcomes at an acceptable level. S/he deals with the theoretical substance of the study module analytically enough, and applies it in an appropriate manner.

In supervised teaching practice, a pass requires observance of the given programme in a manner that corresponds to the grade "good". The study module calls for a good mastery of the subjects to be taught by

the student, and application of didactic knowledge in the subjects. The assessment criteria focus on commitment, interaction, target orientation, assessment, and expertise.

**Grading:**

Pass/fail

**Person responsible:**

Raimo Kaasila

**Working life cooperation:**

Non

**050124A: Advanced Practice, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Education

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

5 ECTS

**Language of instruction:**

Finnish

**Timing:**

4. year, 1. period

**Learning outcomes:**

Having completed the study module, the student knows how to

- plan independently for work with pupils and students
- apply his/her knowledge about assessment and plan for and implement assessment of study attainments
- apply in practice the knowledge and skills s/he has learnt before
- apply social, multicultural and legal questions related to education in various situations of everyday life
- discuss the significance of teacher responsibility and take independent responsibility of work as a teacher
- explain the meaning of collaboration between school and home.

**Contents:**

The study module includes the following:

- elaboration of the student's own objectives for the practice
- goal-oriented planning, implementation and assessment of lessons based on curricula so that the self-direction of the pupils is also taken into account
- observation and analysis of teaching
- getting to know the three-tier support in basic education
- utilization of the information and communication technologies in teaching
- familiarization with the collaboration between home and school
- special traits of your own subject.

**Mode of delivery:**

Supervised teaching practice in the basic education grades 7–9 and in the upper secondary school at the Oulu Teacher Training School.

Face-to-face teaching

**Learning activities and teaching methods:**

5 credits = 135 lessons (45 minutes each), out of which 50 lessons (45 min each) of face-to-face teaching and 85 lessons (45 min each) of independent work.

Face-to-face teaching:

- lessons to be given 7–9 (75 min each)
- minimum of lessons to be observed 18 (75 min each)

- individual and group supervision 3–3,5 lessons/week (à 75 min)
- working as a co-teacher in the student's own supervision group
- participation in the practice period information meeting and the lectures forming part of the study module

**Target group:**

Students in the secondary teacher education programme

**Prerequisites and co-requisites:**

Subject didactics

Basic practice

Education as an Object of Scientific Research

**Recommended optional programme components:**

The study module is part of the pedagogical studies in secondary teacher education.

**Recommended or required reading:**

To be agreed on at the start of the study module.

**Assessment methods and criteria:**

Pass

A pass for the study module requires observance of the given programme at a level corresponding to the grade "good" and participation in the information meetings, lectures, supervision sessions and events to be announced separately. The study module calls for good mastery of the subjects to be taught by the student. The assessment criteria focus on commitment, interaction, goal-orientedness and assessment.

Fail

The student's performance is deficient or does not show any accomplishment in line with the expected learning outcomes of the study module.

**Grading:**

Pass/fail

**Person responsible:**

Katja Leinonen and Emilia Manninen

**Working life cooperation:**

Non

**050125A: Teacher as a Researcher in Teaching Practice, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Education

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

5 ECTS

**Language of instruction:**

Finnish

**Timing:**

4. year, 2. period

**Learning outcomes:**

Having completed the study module, the student knows how to

- apply his/her knowledge of educational philosophy in a constructive way when working with other actors in the field of education in the context of philosophical and ethical issues in education
- apply the knowledge and skills s/he has learnt and carry independent responsibility for his/her work as a teacher
- explain the meaning of multiprofessional collaboration in a teacher's work
- discuss the significance of student welfare services in a teacher's work

- analyze and apply the knowledge and skills acquired in previous studies in independent work with pupils and students
- sum up the meaning of assessment in a teacher's work and apply this knowledge in the planning and implementation of assessment.

### **Contents:**

The study module includes

- deepening one's own objectives in teaching practice
- observation and analysis of teaching and modules of teaching
- independent, goal-oriented planning, implementation and assessment of a broad teaching package based on curricula in such a way that self-regulation of learning is also taken into account
- taking independent responsibility for teaching
- deepening the teacher's job description (the pupil and familiarization with student welfare, encountering different learners and situations, familiarization with ethical moral issues and values, the learner as an independent, active actor and influential person, familiarization with the collaboration between home and school)
- special traits of the student's own subject

### **Mode of delivery:**

Supervised teaching practice in the lower and upper secondary school of the Oulu Teacher Training School

### **Learning activities and teaching methods:**

5 credits = 135 lessons (45 minutes each), including 50h (45 min each) of face-to-face teaching and 85h (45 min each) of independent work.

Face-to-face teaching:

- lessons to be given: 9–10, which can also include co-teaching and remedial lessons (75 min each)
- lessons to be monitored: a minimum of 15 (75 min each)
- individual and group supervision 3–3,5 lessons/week (75 min each)
- working as a co-teacher in your own group
- participation in the practice period information meeting and in the lectures forming part of the study module

### **Target group:**

Students in the secondary teacher education programme.

### **Prerequisites and co-requisites:**

Subject didactics  
Basic practice  
Advanced practice

### **Recommended optional programme components:**

The study module is part of the pedagogical studies in secondary teacher education.

### **Recommended or required reading:**

The Oulu Teacher Training School curricula  
To be agreed on at the start of the study module.

### **Assessment methods and criteria:**

Pass

A pass for the study module requires observance of the given programme at a level that corresponds to the grade "good" as well as participation in the info meetings, lectures, supervision sessions and events to be announced separately. The study module calls for good mastery of the subjects to be taught by the student. The assessment criteria focus on commitment, interaction, target orientation and assessment as well as expertise.

Fail

The student's performance in the study module is deficient or it does not show accomplishment in line with the expected learning outcomes of the module.

### **Grading:**

Pass/fail

**Person responsible:**

Katja Leinonen and Emilia Manninen

**Working life cooperation:**

Non

## 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:**

Itsenäinen opiskelu: kirjatentti.

**Learning activities and teaching methods:**

Book exam (3 h). Exam is held in Examinarium, instructions: <https://www.oulu.fi/forstudents/e-exam>

**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. Timo Muotka):**

- 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 (Annamari Markkola):**

- 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 (Heikki Helanterä):**

- 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.

**Plant physiology orientation (prof. Hely Häggman)**

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

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

**Assessment methods and criteria:**

Book exam in biology public exam day.

Exam in Examinarium: <http://www oulu.fi/english/studying/examinarium>

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

**Grading:**

1-5 / Fail.

**Person responsible:**

Dr. Heikki Helanterä, Prof. Hely Häggman, Doc. Annamari Markkola or Prof. Timo Muotka.

**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, Lumi Viljakainen

**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. 2<sup>nd</sup> spring or M.Sc. 1<sup>st</sup> spring, ECOGEN ECO and BS.

**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, 36 h exercises (laboratory and computer exercises), seminar, final exam.

**Target group:**

M.Sc. degree: 1st spring ECO optional, ECOGEN eco 1st spring compulsory.

**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:**

ECO: Population ecology 10 cr. (755336A).

**Recommended or required reading:**

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:**

Final exam and seminar.

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

**Grading:**

1-5 / Fail.

**Person responsible:**

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.

## 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

**Opettajat:** Kari Koivula, Muotka, Timo Tapani

**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. Timo Muotka.

**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 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. Timo Muotka, Doc. Annamari Markkola and Dr. Heikki Helanerä.

**Working life cooperation:**

No.

**Other information:**

-

**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, Seppo Rytönen

**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 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 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 and Doc. Seppo Rytönen.

**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 Rytönen

**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 Doc. Kari Koivula.

**Working life cooperation:**

No.

**Other information:**

-

**755636S: Population ecology, 10 op**

**Voimassaolo:** 01.08.2019 - 31.07.2020

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Kvist, Laura Irmeli

**Opintokohteen kielet:** English

**Leikkaavuudet:**

756651S Introduction to population ecology 5.0 op

755626S Advanced population ecology 6.0 op

**ECTS Credits:**

10 ECTS credits / 266 hours of work + optional 5 ECTS.

**Language of instruction:**

English.

**Timing:**

ECOGEN 1st autumn– 1st spring.

**Learning outcomes:**

Basic skills in methods of population biology. Student learns basic on theory and application of population ecology methodologies.

**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 and mark-recapture 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, mark-recapture models and simulation programs. In addition, the student can take an optional field course part for collecting and analyzing population ecological data.

**Mode of delivery:**

Face-to-face teaching

**Learning activities and teaching methods:**

36 h lectures, 50 h computer exercises, seminar and an optional field course with a report.

**Target group:**

ECOGEN eco: MSc compulsory.

**Prerequisites and co-requisites:**

Basics of ecology (750124P) or equivalent knowledge.

**Recommended optional programme components:**

-

**Recommended or required reading:**

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

Two exams. A report of the optional part.

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

**Grading:**

1-5 / Fail.

**Person responsible:**

Doc. Laura Kvist.

**Working life cooperation:**

-

**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:**

Dr. Heikki Helanterä, Prof. Hely Häggman, Doc. Annamari Markkola or Prof. Timo Muotka.

**Working life cooperation:**

Thesis is made in research groups.

**Other information:**

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## **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.

## **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:** Klintrup, Outi-Mirjami

**Opintokohteen kielet:** English

**ECTS Credits:**

1 ECTS credits / 27 hours of work

**Language of instruction:**

English

**Timing:**

International students in their 1st academic year, of Master's Degree Programme in Environmental Engineering and Industrial Engineering and Management (Product Management). The course is held once in the autumn semester, during period II and, once in the spring semester, during period IV.

**Learning outcomes:**

Upon completion of the course, the students:

- can search scientific information for their thesis,
- know how to evaluate search results and information sources,
- understand the principles of scientific publishing,
- can use a reference management tool.

**Contents:**

Scientific information retrieval and the search terms, the most important databases and publication channels of the discipline, tools for evaluating the quality of scientific information and RefWorks reference management tool.

**Mode of delivery:**

Blended teaching

**Learning activities and teaching methods:**

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

**Target group:**

The course is compulsory for the international students of Master's Degree Programme in Environmental Engineering (BEE) and for the Master's Degree Programme in Industrial Engineering and Management (Product Management) ), and optional for other degree students working on their diploma/master's thesis.

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

Web learning material: "Finding scientific information" <http://libguides oulu.fi/findinginformation>

**Assessment methods and criteria:**

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

**Grading:**

Pass/fail

**Person responsible:**

Ursula Heinikoski

**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:** Lumi Viljakainen

**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:**

Student can isolate DNA from different organisms, estimate the quality and measure the quantity of DNA, amplify DNA fragments using polymerase chain reaction, design PCR primers and sequence DNA. The student is able to evaluate the results and optimize the methods.

**Contents:**

Isolation of genomic DNA, amplification of DNA by PCR, primer design, DNA sequencing, molecular cloning, analysis of DNA-sequence and writing scientific reports.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

48 h laboratory work including demonstrations, 50 h independent work including homework and writing 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. Lumi Viljakainen.

**Working life cooperation:**

No.

**Other information:**

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## Tutkintorakenteisiin kuulumattomien opintokokonaisuuksien ja -jaksojen kuvaukset

### 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

**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:**

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