Opasraportti

Courses in English for Exchange Students 2015 - 2016 (2015 - 2016)

BIOLOGY COURSES IN ENGLISH FOR EXCHANGE STUDENTS

This Weboodi Course Catalogue lists courses taught in English for exchange students at the Biology Degree Programme during academic year 2015-2016.

When planning your exchange studies and the required learning agreement please use the information provided under the **Courses** tab in this catalogue. Please read carefully the information of each course you wish to take (language of instruction, target group, course content, timing, preceding studies, additional information etc.).

All exchange students must submit their exchange application through SoleMOVE.

Accepted exchange students are required to register to all courses. Course registration takes place once you have arrived in Oulu and received your University of Oulu login information. More information on registration will be provided during orientation. When registering you will be able to find detailed information on teaching and schedule under **Instruction** tab.

Individual course codes include information on the level of course.

xxxxxxP, xxxxxxY = basic, introductory level courses
xxxxxxA = for 2-3 year students, Bachelor level courses
xxxxxxS = for 4-5 year students, Master level courses

Some of the biology courses have both xxxxxxA and xxxxxxS course code. Exchange students can include these courses either to their Bachelor studies or Master's studies.

The courses are for for biology exchange students who have studied for two years or more. Other degree programme exchange students can take the courses if they have enough grounding studies in biology and if the course resources allow.

Any questions about courses at the Biology Degree Programme should be addressed to:

Minna Vanhatalo
Minna.Vanhatalo(at)oulu.fi.

Further information on application process and services for incoming exchange students:

http://www.oulu.fi/english/studentexchange
international.office(at)oulu.fi

Tutkintorakenteisiin kuulumattomat opintokokonaisuudet ja -jaksot

751635S: Advanced course in animal physiology, 8 op
752682S: Advanced course in plant biology, 9 op

755318A: Animal physiology, exercises, 4 op
756351A: Basics in population ecology, 5 op
756347A: Conservation of biodiversity, 5 op
750349A: Examinations on optional topics in biology, 2 - 10 op
757621S: Experimental course in evolutionary genomics, 5 op
755321A: Field course in aquatic animals, 5 op
756343A: Field course in ecological botany, 5 op
755322A: Field course in terrestrial animals, 5 op
755324A: Functional animal ecology, 5 op
751373A: Identification of animals, 5 op
756342A: Identification of plant species, 3 - 4 op
756650S: Introduction to molecular ecology, 5 op
Compulsory
756650S-02: Introduction to molecular ecology, exercises, 0 op
756650S-01: Introduction to molecular ecology, lectures, 0 op
750629S: Kaamos symposium, 2 - 4 op
752316A: Macro fungi, 3 op
755325A: Methods in ecology I, 5 op
750399A: Optional examinations in environmental protection, 2 - 6 op
756615S: Physiology of forest trees, 5 op
756344A: Plant ecology, 5 op
756604S: Plant ecophysiology in changing environments, 5 op
756627S: Plant hormones, 5 op
750613S: Research training, 2 - 15 op
750313A: Research training, 2 - 15 op
750318A: Thursday seminar in biology, 2 op
755328A: Wildlife management and game animal ecology, 5 op
750377A: Winter ecology and physiology, 5 op

Opintojaksojen kuvaukset

Tutkintorakenteisiin kuulumattomien opintokokonaisuuksien ja -jaksojen kuvaukset

751635S: Advanced course in animal physiology, 8 op

Voimassaolo: - 31.07.2019
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Field of Biology
Arvostelu: 1 - 5, pass, fail
Opettajat: Hohtola, Esa Juhani
Opintokohteen kielet: Finnish

ECTS Credits:
8 ECTS credits / 213 hours of work.
Language of instruction:
Finnish / (English).
Timing:
M.Sc. 1 st autumn.
Learning outcomes:
After completing the course the student is able to plan and execute small physiological research projects as well as analyze, interpret and report the results in scientific format. The course thus trains the student for preparing his /her master’s thesis.

Contents:
The course comprises of 2-3 extensive laboratory exercises that are carried out as small research projects. The exercises can be from any area of physiology. The students will themselves plan the schedule for the experiment, and write the results in the form of a scientific publication. The report will be presented in a concluding seminar either as an oral presentation or poster.
Mode of delivery:
Face-to-face teaching.
Learning activities and teaching methods:
Laboratory work, group meetings, report, writing, seminar.
Target group:
Compulsory to BSz, exchange students.
Prerequisites and co-requisites:
Animal physiology lectures and exercises (751388, 755318A), Comparative animal physiology (751x84A/S) and Laboratory, instrumentation and measurement techniques (750x22A/S).
Recommended optional programme components:
-
Recommended or required reading:
The required scientific articles and other material will be distributed during the course.
Assessment methods and criteria:
Exercises, reports and final seminar.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Pass / Fail.
Person responsible:
Prof. Esa Hohtola.
Working life cooperation:
No.
Other information:
-

752682S: Advanced course in plant biology, 9 op

Voimassaolo: - 31.07.2018

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Anna-Maria Pirttilä, Häggman, Hely Margaretha

Opintokohteen kielet: Finnish

ECTS Credits:
9 ECTS credits / 240 hours of work.
Language of instruction:
Finnish / English.
Timing:
M.Sc. 1 st or 2 nd spring, every second year.
Learning outcomes:
The student will be able to evaluate how gene expression affects plant development and metabolism, learns both holistic and specific methods of studying gene expression. She/he is also able to evaluate and analyze the reliability of the data achieved. The student will also be familiar with the most recent literature of the field.
Contents:
Due to the new sequencing technologies the amount of sequence data will increase rapidly. The course will focus on gene expression and especially on regulation of gene expression (transcription factors, RNAi, microRNAs, genome level regulation, histone acetylation, and methylation). Research methods at transcriptome, proteome and metabolome level will be included as well as qualitative and quantitative methods both at single gene level but also at global level. The exercises include methodology used in gene expression analyses. The seminars will familiarize in the most recent literature.
Mode of delivery:
Face-to-face teaching.
Learning activities and teaching methods:
30 h lectures and seminar, 68 h exercises (demonstrations included), reports, final exam.

Target group:
BSb: compulsory MSc studies either course Advanced course in plant biology (752682S) 9 cr or Genetic transformation of plants (756625S) 8 cr.
Prerequisites and co-requisites:
Basics of functional plant biology lectures and exercises (752345A, 756341A) and Molecular methods I (750364A) or equivalent knowledge.
Recommended optional programme components:
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Recommended or required reading:
Taiz, L. & Zeiger, E. (2010) Plant Physiology (5th ed.) Sinauer Ass., Sunderland Mass.
The availability of the literature can be checked from this link.
Assessment methods and criteria:
Reports, exam.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5 / Fail.
Person responsible:
Prof. Hely Häggman (lectures) and Doc Anna Maria Pirttilä (excercises).
Working life cooperation:
No.
Other information:
-

755318A: Animal physiology, exercises, 4 op

Voimassaolo: 01.08.2011 - 31.07.2015

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Saarela, Seppo Yrjö Olavi

Opintokohteen kielet: Finnish

Leikkaavuudet:

755327A	Animal physiology exercises	5.0 op

ECTS Credits:
4 ECTS credits / 107 hours of work.
Language of instruction:
Finnish.
Timing:
B.Sc. 3 rd autumn.
Learning outcomes:
Students know basic physiological methods and can design simple experiments.
Contents:
The laboratory course will familiarize students with the use of simple experimental trials, laboratory tests and computer aided measurements the physiological basic principles.
Mode of delivery:
Face-to-face teaching.
Learning activities and teaching methods:
32 h laboratory training, exam.
Target group:
BS compulsory, TEAbs optional.
Prerequisites and co-requisites:
Cell biology (750121P) and Animal physiology, lectures (751388A).
Recommended optional programme components:
This course is a prerequisite for the courses Comparative animal physiology (751x84A/S), and Advanced animal physiology (751635S).
Recommended or required reading:
Animal physiology course booklet.
Assessment methods and criteria:

Exam.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5 / Fail.
Person responsible:
Prof. Seppo Saarela.
Working life cooperation:
No.
Other information:
-

756351A: Basics in population ecology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Orell, Markku Ilmari, Kvist, Laura Irmeli

Opintokohteen kielet: Finnish

Leikkaavuudet:

755336A	Population ecology	10.0 op
756323A	Population biology of plants	5.0 op

ECTS Credits:
5 ECTS credits / 133 hours of work.
Language of instruction:
Finnish.
Timing:
BSc. 3 rd autumn.
Learning outcomes:
Basic skills in methods of population biology.
Contents:
Demography and life history strategies of plants with emphasis on dynamics of structured plant populations in space and time. Moreover, ecological and evolutionary genetics of plants and interactions between plants and their environment are addressed. In exercises dynamics of populations is analysed with matrix models and simulation programs.
Mode of delivery:
Face-to-face teaching.
Learning activities and teaching methods:
32 h lectures, 18 h computer exercises, seminar.
Target group:
ECO: compulsory.
Prerequisites and co-requisites:
No.
Recommended optional programme components:
-
Recommended or required reading:
Silvertown & Charlesworth 2001: Introduction to Plant Population Biology (4 th edition), Blackwell Science.
The availability of the literature can be checked from this link.
Assessment methods and criteria:
Exam. Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5 / Fail.
Person responsible:
Prof. Markku Orell and Dr. Laura Kvist
Working life cooperation:
No.
Other information:
-

756347A: Conservation of biodiversity, 5 op

Voimassaolo: 01.08.2015 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Field of Biology
Arvostelu: 1 - 5, pass, fail
Opettajat: Jari-Heikki Oksanen
Opintokohteen kielet: Finnish
Leikkaavuudet:

ay756347A	Conservation of biodiversity (OPEN UNI)	5.0 op
752321A	Conservation of Biodiversity	3.0 op

ECTS Credits:
5 ECTS credits / 133 hours of work.
Language of instruction:
English.
Timing:
B.Sc. 3 rd autumn. NNE.
Learning outcomes:
Students know the central concepts of biodiversity, threads to biodiversity, and methods of conservation of biodiversity.
Contents:
Biodiversity and its components. Major theories of the ecological control of biodiversity. Habitat fragmentation and habitat destruction and their consequences. Metapopulation theory and networks of nature reserves. Current issues in the conservation of biodiversity.
Mode of delivery:
Face-to-face teaching.
Learning activities and teaching methods:
14 h lectures, literature, exam.
Target group:
Biology students. Students who are participating in environmental conservation or tourism minor.
Prerequisites and co-requisites:
No
Recommended optional programme components:
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Recommended or required reading:
Hanski I. 2005: The Shrinking World. International Ecology Institute, Oldendorf/Luhe, Germany. The availability of the literature can be checked from this link.
Assessment methods and criteria:
Exam. Read more about assessment criteria at the University of Oulu webpage.
Read more about assessment criteria at the University of Oulu webpage.

Grading:
1-5 / Fail.
Person responsible:
Prof. Jari Oksanen.
Working life cooperation:
No.
Other information:
-

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

Voimassaolo: 01.08.2015 -
Opiskelumuoto: Intermediate Studies
Laji: Course

Vastuuyksikkö: Field of Biology
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish
Leikkaavuudet:

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

Assessment methods and criteria:
Read more about assessment criteria at the University of Oulu webpage.

757621S: Experimental course in evolutionary genomics, 5 op

Voimassaolo: 01.08.2015 - 31.07.2020
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Field of Biology
Arvostelu: 1 - 5, pass, fail
Opettajat: Phillip Watts
Opintokohteen kielet: Finnish
Leikkaavuudet:

753624S	Experimental course in evolutionary genomics	4.0 op

ECTS Credits:
5 ECTS credits / 133 hours of work.
Language of instruction:
English.
Timing:
M.Sc. 2nd spring.
Learning outcomes:
After the course the student will be able to analyze DNA sequence differences between species, applying the knowledge obtained during courses in bioinformatics and molecular evolution. The student will know how to retrieve information from public sequence databases, characterize sequences, estimate nucleotide substitutions, align sequences, build phylogenetic trees and estimate their confidence. The student will be capable of making a hypothesis related to molecular evolution and test it using sequence data.
Contents:
Sequence databases, methods and computer programs for handling and analysing sequences obtained from databases. Research appropriate scientific literature. Work is done mainly in the computer classroom.
Mode of delivery:
Face-to-face teaching.
Learning activities and teaching methods:
48 hr exercises including demonstrations and seminar, independent work including reports.
Target group:
BSg students.
Prerequisites and co-requisites:
Advanced course in bioinformatics (757619S) and Molecular evolution (757312A) or equivalent knowledge.
Recommended optional programme components:
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Recommended or required reading:
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Assessment methods and criteria:
Reports, independent work and seminar.
Grading:
1-5 / Fail.
Person responsible:
Phillip Watts.
Working life cooperation:

No.
Other information:
-

755321A: Field course in aquatic animals, 5 op

Voimassaolo: 01.08.2015 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Field of Biology
Arvostelu: 1 - 5, pass, fail
Opettajat: Kaisa-Leena Huttunen, Heikki Mykrä
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. 1 st summer.
Learning outcomes:
To learn basic methods in identifying and sampling of freshwater animals.
Contents:
Identification of the most important freshwater fishes and invertebrates. Demonstrations of the most frequently-used sampling methods.
Mode of delivery:
Face-to-face teaching.
Learning activities and teaching methods:
Summer: 6 h lectures in Oulu and 70 h of field work and demonstrations at the Oulanka research station.
Target group:
Compulsory (4 cr) to ECO. TEAeco: either Field course in aquatic animals 4 cr or Field course in terrestrial animals 4 cr is compulsory for biology major, the other field course can be included to the ecology minor. TEAbs, alternatively compulsory to TEAbs either Field course in aquatic animals 4 cr or Field course in terrestrial animals 4 cr (at least 9 cr compulsory, two field courses, one animal and other botany field course).
Prerequisites and co-requisites:
Basic identification of animals (751373A) or equivalent knowledge (if necessary, selection to the course 751307A can be based on success in course 751373A).
Recommended optional programme components:
This course is a prerequisite for the following: Winter ecology and physiology (750325A), Special course in aquatic invertebrates (751648S), Assessment and monitoring of the ecological status of water bodies (754613S), Field methods in freshwater biomonitoring (754616S), Research seminar in fish ecology (754618S), Special course in fish ecology (754619S).
Recommended or required reading:
Handouts and lectures given 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.
Read more about assessment criteria at the University of Oulu webpage.

Grading:
1-5 / Fail.
Person responsible:
M.Sc. Kaisa-Leena Huttunen.
Working life cooperation:
No.

Other information:
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756343A: Field course in ecological botany, 5 op

Voimassaolo: 01.08.2015 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Field of Biology
Arvostelu: 1 - 5, pass, fail
Opettajat: Annamari Markkola
Opintokohteen kielet: Finnish
Leikkaavuudet:

752304A Field course in ecological botany 5.0 op

Assessment methods and criteria:
Read more about assessment criteria at the University of Oulu webpage.

755322A: Field course in terrestrial animals, 5 op

Voimassaolo: 01.08.2015 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Field of Biology
Arvostelu: 1 - 5, pass, fail
Opettajat: Seppo Rytkönen
Opintokohteen kielet: Finnish
Leikkaavuudet:

751306A Field course in terrestrial animals 4.0 op

ECTS Credits:
5 ECTS credits / 133 hours of work.
Language of instruction:
Finnish / English.
Timing:
B.Sc. - 1 st summer. NNE.
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 hold 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:
70 h demonstrations and practicals, one species and theory exam, seminar.
Target group:
Compulsory (4 cr) to ECO. TEAeco: either Field course in terrestrial animals 4 cr or Field course in aquatic animals 4 cr is compulsory for biology major, the other field course can be included to the ecology minor. TEAbs: alternatively compulsory to TEAbs either Field course in terrestrial animals 4 cr. or Field course in aquatic animals 4 cr (at least 9 cr compulsory, two field courses, one animal and other botany field course).

Prerequisites and co-requisites:
Basic identification of animals (751373A) or equivalent knowledge.
Recommended optional programme components:
This course is a prerequisite to course Winter ecology and physiology (750325A). Recommended course after this is Special course in ornithology (755614S).
Recommended or required reading:
Compulsory at Oulanka: 1) Rytkönen, S. ym. 2003: 751306 Maaeläimistön tuntemus ja ekologia. - Biologian laitoksen monisteita 3/2003. Oulun yliopisto, Oulu. 2), Itämies, J. & Viro, P. 1995: Eläinten lajintuntemus, selkärangattomat. Eläintieteen laitoksen monisteita 1/1995, Oulun yliopisto, Oulu. Insect book recommended: Chinery, M. 1988 Pohjois-Euroopan hyönteisheimojen määritysopas, Tammi, Helsinki, 2. painos. The availability of the literature can be checked from this link.
Assessment methods and criteria:
Exam, seminar presentation. Read more about assessment criteria at the University of Oulu webpage.
Read more about assessment criteria at the University of Oulu webpage.

Grading:
1-5 / Fail.
Person responsible:
Dr. Seppo Rytkönen.
Working life cooperation:
No.
Other information:
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755324A: Functional animal ecology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Seppo Rytkönen

Opintokohteen kielet: Finnish

Leikkaavuudet:

751378A Functional animal ecology 6.0 op

ECTS Credits:
5 ECTS credits / 133 hours of work.
Language of instruction:
Lectures in Finnish, exercises in Finnish / English.
Timing:
B.Sc. 2 nd spring or M.Sc. 1 st spring. NNE.
Learning outcomes:
The aim of the course is to understand the relationship between morphology and function by the means of general ecomorphological model. The student will get both theoretical and practical basics for ecomorphological (and. general scientific) research procedures: scientific hypothesizing, sampling, data analysis and reporting and interpreting the results.
Contents:
The course focuses on the relationship between phenotype and function, especially the correlation between animal morphology and behaviour. The course consists of two parts: A) Lectures in Finnish. However, articles about each subject are available for foreign students, including ecomorphological models and correlations, measurement error, allometry, fluctuating asymmetry and phylogenetic analyses. B) Exercises consisting of miniature studies, field and laboratory work, and seminar. The results of the mini studies, in form of PowerPoint presentations, are presented in the seminar. Before the exercises, students write a home essay (or take an exam).
Mode of delivery:
Face-to-face teaching.
Learning activities and teaching methods:
12 h lectures, 40 h exercises, seminar and essay or exam.
Target group:
Recommended for ECOe.

Prerequisites and co-requisites:
Recommended Evolution, systematics and morphology of animals, practicals (755312A) and Basics of statistics I (806109P).
Recommended optional programme components:
-
Recommended or required reading:
-
Assessment methods and criteria:
Essay or exam. Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5 / Fail.
Person responsible:
Dr. Seppo Rytkönen.
Working life cooperation:
No.
Other information:
-

751373A: Identification of animals, 5 op

Voimassaolo: - 31.07.2016

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Koivula, Pudas, Tuula Kaarina

Opintokohteen kielet: Finnish

ECTS Credits:
5 ECTS credits / 133 hours of work.

Language of instruction:
Finnish / English.
Timing:
B.Sc. 1 st autumn and spring. NNE.
Learning outcomes:
Main point of the course is to learn to indentify Finnish animal species (vertebrate) and families (invertebrate) from museum samples. Basics of species' ecology and classification of organisms.
Contents:
During the autumn semester (2 h lectures, 16 h exercises, exam), the Finnish vertebrate fauna is studied using stuffed museum samples. In the spring semester (14 h lectures, 24 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:
16 h lectures, 40 h exercises, 2 exams.

Target group:
Compulsory to the biology students.

Prerequisites and co-requisites:
No.
Recommended optional programme components:
This course is needed for attending courses Field course in terrestrial animals (751306A) and Field course in aquatic animals (751307A).
Recommended or required reading:
Course handouts, Itämies J. ja Viro P. 1995: Eläinten lajintuntemus, selkärangattomat, 73 p.; Putaala, A., Marjakangas, A. & Rytkönen, S. 2001: Eläinten lajintuntemus, selkärankaiset, 42 p.
The availability of the literature can be checked from this link.
Assessment methods and criteria:

Two species exams.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5 / Fail.
Person responsible:
Dr. Kari Koivula.
Working life cooperation:
No.
Other information:
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756342A: Identification of plant species, 3 - 4 op

Voimassaolo: 01.08.2015 - 31.07.2017
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Field of Biology
Arvostelu: 1 - 5, pass, fail
Opettajat: Annamari Markkola
Opintokohteen kielet: Finnish
Leikkaavuudet:

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

ECTS Credits:
3-4 ECTS credits / 80-107 hours of work. NNE.
Language of instruction:
Finnish / English.
Timing:
B.Sc. 1 st autumn.
Learning outcomes:
Student is able to identify most common boreal plant species in herbarium specimens.
Contents:
Demonstrations (16 h) and/orindependent study of ca. 350 vascular plants, mosses and lichens in the boreal vegetation zone. 3 cr. without the literature in the exam and 2 cr. with the literature in the exam. In the identification exam student has to know specimens scientific name and family in latin.
Mode of delivery:
Face-to-face teaching.
Learning activities and teaching methods:
16 h demonstrations and learning from the herbarium samples. In the identification exam student has to know specimens scientific name and family in latin.
Target group:
3 cr compulsory to TEA and ECO, 2 cr compulsory to BS.
Prerequisites and co-requisites:
No.
Recommended optional programme components:
Course is prerequisite for the Field course in ecological botany (752304A) and for the advanced plant species identification courses.
Recommended or required reading:
Booklet Hanhela, P. & Halonen, P. 1995: Plant Identification.
The availability of the literature can be checked from this link.
Assessment methods and criteria:
Species exam. 3 cr. without the literature and 2 cr. with the help of the literature. Read more about assessment criteria at the University of Oulu webpage.
Read more about assessment criteria at the University of Oulu webpage.

Grading:
1-5 / Fail.
Person responsible:
Dr. Annamari Markkola.

Working life cooperation:
No.
Other information:
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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: Tanja Pyhäjärvi, Kvist, Laura Irmeli

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 nd spring BSg, M.Sc. 1 st spring, ECOGEN ECO and BS. Introduction to Population genetics compulsory to BSg in M.Sc degree.
Learning outcomes:
This course introduces genetic theories, basics of phylogenetics and usage of molecular biology methods in ecology. The aim is that students know the basic methodology, can apply them into variety of genetic and ecological questions and is familiar with basics of population genetics and phylogenetics in order to be able to analyze and interpret genetic data.
Contents:
Basics of population genetics (variation, effective population size, bottlenecks, population structure, gene flow), relationships between molecular and adaptive variation, phylogenetic methods and phylogeography. Usage of molecular methods for identification of species, sex and individuals, behavioural ecology (mating systems, cooperation, mating success) and conservation.
Mode of delivery:
Face-to-face teaching.
Learning activities and teaching methods:
Population genetics: 20 h lectures, 4 h seminars, 24 h exercises (problem solving, laboratory and computer exercises), report, essays, home exam, final exam. *Molecular ecology:* 20 h lectures, 4 h seminars, 36 h exercises (laboratory and computer exercises), final exam.
Target group:
BSc: BS optional 2nd spring; MSc: 1st spring BSg compulsory. ECOGEN: BS and ECO.
Prerequisites and co-requisites:
Concepts of genetics (757109P) and Experimental course in general genetics (757110P) and Molecular evolution (757312A) or equivalent knowledge.
Recommended optional programme components:
Population genetics BS: Recommended prerequisite for course Quantitative genetics and plant and animal breeding (757616S). Compulsory prequisite for courses Experimental course in evolutionary genomics (757621S), Advanced course in bioinformatics (757619S) and DNA analysis in population genetics (757618S).
Molecular ecology ECO: Basics in population ecology (756351A) and advanced course in population ecology (755626S).
Recommended or required reading:
Hedrick 2005: Genetics of populations 3. or 4. ed. Beebee, T and Rowe G.2004 or 2008. An introduction to molecular ecology. Oxford University Press.
Assessment methods and criteria:
Population genetics: Home exam, final exam, seminar, essays, reports.
Molecular ecology: Final exam and seminar.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5 / Fail.

Person responsible:
Dr. Laura Kvist and Dr. Tanja Pyhäjärvi.
Working life cooperation:
No.
Other information:
Note that Introduction to Molecular ecology and Introduction to population genetics courses are alternative; students cannot get credits from both.

Compulsory

756650S-02: Introduction to molecular ecology, exercises, 0 op

Voimassaolo: 01.08.2015 - 31.07.2019
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Field of Biology
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: English

Ei opintojaksokuvauksia.

756650S-01: Introduction to molecular ecology, lectures, 0 op

Voimassaolo: 01.08.2015 - 31.07.2019
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Field of Biology
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: English

Ei opintojaksokuvauksia.

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., Ph.Lic. and Ph.D. autumn.
Learning outcomes:
Students get acquainted to preparing, presenting and evaluating a scientific oral presentation.
Contents:
The Kaamos Symposium consisting of presenting current research projects is held every year at the end of autumn period. Through presenting their research work and projects and obtaining feedback from the audience (students and the staff of the department) post graduate students gain experience in holding a scientific presentation.
Mode of delivery:
Face-to-face teaching.

Learning activities and teaching methods:
Own presentation and the whole symposium 4 cr (postgraduate students), Organizing the symposium 3 cr (postgraduate students), poster 2 cr (postgraduate students), summary of five presentations and symposium 2 cr (undergraduate students).
Target group:
Undergraduate and postgraduate biology students.
Prerequisites and co-requisites:
No.
Recommended optional programme components:
-
Recommended or required reading:
Abstract book.
Assessment methods and criteria:
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:
-

752316A: Macro fungi, 3 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Annamari Markkola

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay752316A	Macro fungi (OPEN UNI)	3.0 op

ECTS Credits:
3 ECTS credits / 80 hours of work.
Language of instruction:
Finnish / English.
Timing:
B.Sc. 3 rd autumn. NNE.
Learning outcomes:
Student is able to identify most common macrofungal species as fresh specimens and knows basics of fungal ecology.
Contents:
Demonstrations of macrofungi in the field, basics of identification, ecology and distribution.
Mode of delivery:
Face-to-face teaching.
Learning activities and teaching methods:
14 h lectures, 25 h exercises including excursions, identification exam.
Target group:
Optional.

Prerequisites and co-requisites:
No.
Recommended optional programme components:
-
Recommended or required reading:
Course handout, Salo, P. and Nummela-Salo, U. 2002: Sienikurssi (752316). Toinen uusittu painos. Lajiesittelyt. Biologian laitoksen monisteita 2/2002, 41 p. and mushroom guides.

The availability of the literature can be checked from this link.
Assessment methods and criteria:
Species identification exam.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5 / Fail.
Person responsible:
Dr. Annamari Markkola.
Working life cooperation:
No.
Other information:
-

755325A: Methods in ecology I, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Koivula

Opintokohteen kielet: Finnish

Leikkaavuudet:

750347A Ecological methods I 6.0 op

ECTS Credits:
5 ECTS credits / 133 hours of work.
Language of instruction:
Finnish / English.
Timing:
B.Sc. 3 rd autumn.
Learning outcomes:
Students are familiar to scientific method and can separate scientific information from other contents of culture. Students have learned to assess the uncertainty of information and can evaluate the quality of information with respect to its applied value. Students also learn the build a valid theoretical or empirical strategy to solve scientific problems.
Contents:
The aim of the course is to introduce the students in scientific modes of argumentation and research methods in modern ecology. Both the empirical and theoretical methods and their relationship in theory formation are discussed. Hypothesis testing; observational method, experimental method and comparative method are the empirical methods introduced. Autumn period ends in a seminar where scientific publications are analysed.
Mode of delivery:
Face-to-face teaching.
Learning activities and teaching methods:
Lectures, seminar, exercises and exam.
Target group:
Compulsory to ECO.
Prerequisites and co-requisites:
No.
Recommended optional programme components:
-
Recommended or required reading:
-
Assessment methods and criteria:
Exam. Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5 / Fail.
Person responsible:
Dr. Kari Koivula, Dr. Seppo Rytkönen and Prof. Markku Orell.
Working life cooperation:

No.
Other information:
-

750399A: Optional examinations in environmental protection, 2 - 6 op

Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Field of Biology
Arvostelu: 1 - 5, pass, fail
Opettajat: Kari Taulavuori
Opintokohteen kielet: Finnish
Voidaan suorittaa useasti: Kyllä

ECTS Credits:
2-6 ECTS credits / 53-160 hours of work. About 100 pages / 1 ECTS credit.
Language of instruction:
Most books are in English.
Timing:
B.Sc. or M.Sc. degree.
Learning outcomes:
To understand environmental protection in global context.
Contents:
Depends on the book.
Mode of delivery:
Face-to-face teaching.
Learning activities and teaching methods:
Three times per both semesters in biology public exam days. Exam days are announced in WebOodi.
Target group:
Biology, geography, geology, environmental engineering , exchange students.
Prerequisites and co-requisites:
No.
Recommended optional programme components:
-
Recommended or required reading:
Gaston & Spicer (2004) Biodiversity – an introduction. Blackwell Publishing, 191p; Lockwood et al. (2007) Ivasion Ecology, Blackwell Publishing, 304 p; ACIA (2005) Arctic Climate Impact Assessment, Cambridge University Press, 1042 p.; Dincer et al. (2013) Causes, Impacts and Solutions to Global Warming, Springer, 1183 p.
Assessment methods and criteria:
Exam.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5 / Fail.
Person responsible:
Dr. Kari Taulavuori.
Working life cooperation:
No.
Other information:
Student has to consult about the selected literature before exam.

756615S: Physiology of forest trees, 5 op

Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Field of Biology
Arvostelu: 1 - 5, pass, fail
Opettajat: Häggman, Hely Margaretha
Opintokohteen kielet: Finnish

ECTS Credits:
4 ECTS credits / 107 hours of work.
Language of instruction:
Finnish / English.
Timing:
M.Sc. 1 st or 2 nd spring, (arranged if resources allow).
Learning outcomes:
The student is able to assess the specific features of forest tree physiology and from this basis can judge the effect of climate change to forestry.
Contents:
Trees are long-living, often wind-pollinated, tall organisms. The juvenile phase may be long and the adult phase is characterized by both reproductive and vegetative growth which causes competition on both carbohydrates and nutrients. Cold- and drought resistance, water relations, carbon allocation and mineral nutrition will be discussed. Partly due to forest tree's economic importance biotechnological applications have been developed e.g. for the production of health promoting substances or vegetative propagation. Forest trees are interesting from the point of molecular biology- what makes a tree tree? The course will cover these topics but the emphasis may vary during the years.
Mode of delivery:
Face-to-face teaching.
Learning activities and teaching methods:
Lectures, literature, seminar, final exam.
Target group:
-
Prerequisites and co-requisites:
Lectures of Basics of functional plant biology (752345A) helps the following of the course.
Recommended optional programme components:
-
Recommended or required reading:
Literature agreed on lectures.
Assessment methods and criteria:
Exam.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5 / Fail.
Person responsible:
Prof. Hely Häggman.
Working life cooperation:
No.
Other information:
-

756344A: Plant ecology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Taulavuori, Annamari Markkola

Opintokohteen kielet: Finnish

Leikkaavuudet:

752300A	Plant ecology	7.0 op

ECTS Credits:
5-7 ECTS credits / 133-187 hours of work.
Language of instruction:
Lectures Finnish, Exercises Finnish / English.
Timing:
B.Sc. 2nd autumn. NNE.

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:
24 h lectures and exam, 30 h demonstrations and exercises in field and laboratory (basic methods in plant ecology and laboratory work), 10 h seminars on the literature of plant ecology; 4 h final seminars. International students will compensate lectures by reading book Ridge, I. 2002: Plants, Oxford Univ. Press.
Target group:
Compulsory to ECO.
Prerequisites and co-requisites:
Basics of ecology (750124P) and Field course in ecological botany (752304A) or equivalent knowledge.
Recommended optional programme components:
-
Recommended or required reading:
Ridge, I. 2002: Plants. The availability of the literature can be checked from this link.
Assessment methods and criteria:
Lecture exam, laboratory diary and seminar presentation. Read more about assessment criteria at the University of Oulu webpage.
Read more about assessment criteria at the University of Oulu webpage.

Grading:
1-5 / Fail.
Person responsible:
Kari Taulavuori ja Annamari Markkola (lectures), Kari Taulavuori (exercises).
Working life cooperation:
No.
Other information:
-

756604S: Plant ecophysiology in changing environments, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Taulavuori

Opintokohteen kielet: Finnish

ECTS Credits:
5 ECTS credits / 133 hours of work.
Language of instruction:
Finnish / English.
Timing:
B.Sc. 3 rd or M.Sc. 1 st spring.
Learning outcomes:
After finishing the course student understands interactions between plant and environment, and has become acquainted to most important experimental methods in physiological plant ecology and student can apply research parameters. Student can apply the knowledge to plant production and environmental protection issues.

Contents:

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

Mode of delivery:
Face-to-face teaching.
Learning activities and teaching methods:
20 h lectures and demonstrations, 35 h exercises, exam and report.

Target group:
ECOb, BSb, Ph.D. students.
Prerequisites and co-requisites:
No.
Recommended optional programme components:
Course is related both to plant ecology and plant physiology basic studies.
Recommended or required reading:
Hans Lambers, F.Stuart Chapin III, Thijs L. Pons 2008: Plant Physiological Ecology. Springer Verlag. 540 s. Second edition.
The availability of the literature can be checked from this link.
Assessment methods and criteria:
Seminar and report.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5 / Fail.
Person responsible:
Dr. Kari Taulavuori.
Working life cooperation:
No.
Other information:
-

756627S: Plant hormones, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Häggman, Hely Margaretha

Opintokohteen kielet: Finnish

ECTS Credits:
4 ECTS credits / 107 hours of work.
Language of instruction:
Finnish / English.
Timing:
M.Sc. 1 st or 2 nd spring, (arranged if resources allow).
Learning outcomes:
The students will assess the plant hormone action, understand hormone interactions and the significance of the hormone balance as well as the molecular mechanisms.
Contents:
Plant hormones are signalling molecules with profound effects on growth and development at trace quantities. Until quite recently plant development was considered to be regulated by auxins, gibberellins, cytokinins, ethylene

and abscisic acid. New analytical and molecular methods have evidenced new plant hormone receptors and signalling pathways. During the lectures the mode of action of the hormones and the latest literature is used to gain the most recent view of the topic.
Mode of delivery:
Face-to-face teaching.
Learning activities and teaching methods:
20 h and exam.
Target group:
Suitable for BSb and ecophysiologists.
Prerequisites and co-requisites:
Basics of functional plant biology lectures and exercises (752345A, 756341A).
Recommended optional programme components:
-
Recommended or required reading:
Chapters concerning plant hormones from Taiz, L. & Zeiger, E. 2010: Plant Physiology. Sinauer Associates Inc. 5. ed. and literature given in the lectures.
The availability of the literature can be checked from this link.
Assessment methods and criteria:
Exam.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5 / Fail.
Person responsible:
Prof. Hely Häggman.
Working life cooperation:
No.
Other information:
-

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 / 27-378 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:
Professor of the student's major subject.
Working life cooperation:
Yes. Participating to biology project gives working life skills.
Other information:
-

750313A: Research training, 2 - 15 op

Opiskelumuoto: Intermediate Studies

Laji: Practical training

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:
1-14 ECTS credits / 27-378 hours of work.
Language of instruction:
Finnish / English.
Timing:
B.Sc. degree.
Learning outcomes:
Student applies the education given knowledge and skills in working life to gain hands-on experience.
Contents:
Work on special projects in the different biology research groups at the department or elsewhere or independent project work including field and/or laboratory work or work at the biological stations. The work is not included to other study modules in biology.
Mode of delivery:
Face-to-face teaching.
Learning activities and teaching methods:
The topic and the study plan have to be agreed on in advance (registration form). The student has to keep diary and prepare a report on the work.
Target group:
-
Prerequisites and co-requisites:
No.
Recommended optional programme components:
-
Recommended or required reading:
-
Assessment methods and criteria:
Report.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Pass / Fail.
Person responsible:
Professor of the student's major subject.
Working life cooperation:
Yes. Participating to biology project gives working life skills.
Other information:
-

750318A: Thursday seminar in biology, 2 op

Voimassaolo: 01.08.2011 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Field of Biology
Arvostelu: 1 - 5, pass, fail
Opettajat: Hohtola, Esa Juhani
Opintokohteen kielet: English
Voidaan suorittaa useasti: Kyllä

ECTS Credits:
2 ECTS credits / 53 hours of work.
Language of instruction:
English.
Timing:
B.Sc., M.Sc., Ph.Lic. or Ph.D. degree.
Learning outcomes:
Students get knowledge about the current results and theories in biology.
Contents:
Lectures in English on current topics in biology given by guest lecturers from Finland or abroad.
Mode of delivery:
Face-to-face teaching.
Learning activities and teaching methods:
Guest lectures on Thursdays 12 am-1 pm. See notice boards for the lecture schedule. See seminar programme: http://cc.oulu.fi/~ehohtola/tose.htm
Target group:
Undergraduate and postgraduate students interested in biology.
Prerequisites and co-requisites:
No.
Recommended optional programme components:
-
Recommended or required reading:
-
Assessment methods and criteria:
10 participations and 10 one page long reports.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Pass / Fail.
Person responsible:
Prof. Esa Hohtola
Working life cooperation:
No.
Other information:
-

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

Voimassaolo: 01.08.2015 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Field of Biology
Arvostelu: 1 - 5, pass, fail
Opettajat: Kari Koivula, Jouni Aspi
Opintokohteen kielet: Finnish
Leikkaavuudet:

751368A Wildlife management and game animal ecology 6.0 op

Ei opintojaksokuvauksia.

750377A: Winter ecology and physiology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Taulavuori, Orell, Markku Ilmari, Hohtola, Esa Juhani

Opintokohteen kielet: Finnish

Leikkaavuudet:

750325A Winter ecology and physiology 3.0 op

ECTS Credits:
5 ECTS credits / 133 hours of work.
Language of instruction:
English.
Timing:
B.Sc. 3 rd or M.Sc. 1 st spring. NNE.
Learning outcomes:
Student obtains basic knowledge of animal and plant acclimations and adaptations to winter, and can evaluate the effects of cold temperatures and snow on overwintering, and learns central methodology in winter ecology and physiology.
Contents:
Three independent units: 1) Winter ecology and physiology course (7 h lectures and 13 h laboratory practicals and 4 h seminar in Oulu, and 4 day long field excursion to the Oulanka Research Station (total about 50 h, 3 cr); 2) Book exam on a common exam day 2 cr: Marchand, P. J. 1996: Life in the cold. An introduction to winter ecology. 1) Book exam on a common exam day Thermal biology and energetics 3 cr (prof. Esa Hohtola). Examinations on the parts are held independently from each other. Selected literature will be provided.
Mode of delivery:
Face-to-face teaching.
Learning activities and teaching methods:
Lectures, exercises, report and seminar presentation.
Target group:
Biology students.
Prerequisites and co-requisites:
Courses Basics of ecology (750124P), Field course in ecological botany (752304A), Cell biology (750121P), Field course in terrestrial animals (751306A), Field course in aquatic animals (751307A) and Basics of functional plant biology, lectures (752345A) or equivalent knowledge.
Recommended optional programme components:
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Recommended or required reading:
Marchand, P. J. 1996: Life in the cold. An introduction to winter ecology. (3rd edition). University Press of New England. 304 p. The availability of the literature can be checked from this link.
Assessment methods and criteria:
Seminar presentation and book exam. Read more about assessment criteria at the University of Oulu webpage.
Grading:
Course + seminar: Pass / Fail, book exam: 1-5 / Fail.
Person responsible:
Dr. Kari Taulavuori, Prof. Esa Hohtola and Prof. Markku Orell.
Working life cooperation:
No.
Other information:
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