Turun yliopisto
University of Turku

Master's Degree Programme in Environmental Sciences

STUDY GUIDE

2011–2012

Faculty of Mathematics and Natural Sciences

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FOR THE READER

This study guide is intended for international students studying for a Master's degree at the Faculty of Mathematics and Natural Sciences. The guide includes Faculty regulations and instructions for students, and the curriculum of the Master's Degree Programme in Environmental Sciences. Curriculum is based on the new Government Decree on University Educations, which came into force on the 1st of August, 2005.

Information in this guide concerns the academic year 2011–2012. The guide does not include any information about the timetables or the places of the courses. That information can be found in the electronic curricula guide Opsi, on the notice boards or the web sites of the Departments.

Welcome to the Faculty of Mathematics and Natural Sciences!

Hanna Tranberg
Coordinator

DEGREES AND STUDYING AT THE FACULTY OF MATHEMATICS AND NATURAL SCIENCES

General information

In the Faculty of Mathematics and Natural Sciences it is possible to study for the following graduate degrees: Bachelor of Science (luonnontieteiden kandidaatti), Master of Science (filosofian maisteri) in the field of Natural Sciences, Bachelor of Science in Technology (tekniikan kandidaatti) and Master of Science in Technology (diplomi-insinööri). The Bachelor's degree is a first cycle university degree and the Master's degree a second cycle university degree. The studies aiming for the first and second cycle university degrees are conducted in degree programmes.

In the Faculty there are 11 degree programmes in Finnish, in which students mainly study for both the lower and higher degree. The degree programmes are: Biochemistry, Biology, Biotechnology, Physics, Geology, Chemistry, Geography, Mathematics, Information Technology, Computer technology, electronics and communication systems and in Environmental sciences. The Faculty also offers five Master's Degree Programmes in English (in Environmental Sciences, Bioinformatics, Information Technology, Embedded computing, and in Astronomy, (Physical Sciences)), in which students study only for the second cycle university degree. Students admitted to these programmes must hold a BSc degree that formally qualifies the student to access Master level studies in the country where it has been completed. Also a good command of English is required.

The Faculty of Mathematics and Natural Sciences also awards the following postgraduate degrees: Licentiate of Philosophy (filosofian lisensiaatti), Licentiate of Science in Technology (tekniikan lisensiaatti), Doctor of Philosophy (filosofian tohtori) and Doctor of Science in Technology (tekniikan tohtori).

The unit used for measuring academic work is the ECTS credit point (*opintopiste* = *op in Finnish*). The average workload for one academic year, 1600 hours, equals to 60 credit points. The workload for one ECTS credit point is about 27 hours.
The Bachelor's degree requires 180 ECTS credits, and the normative study time is three years. The Master of Science and the Master of Science in Technology degrees require 120 ECTS credits, and the normative study time is two years. Students take the lower university degree first and after that go for the higher degree. These are separate degrees and students receive separate degree certificates for them. Study modules which are included in the lower university degree cannot be included in the higher university degree. However, it is possible to study some Master's level courses even if the Bachelor's degree is not yet finished, since all Master' level courses are not organised every year.

Studies are organised in three levels: basic, intermediate and advanced. In the Faculty of Mathematics and Natural Sciences the basic studies modules equal to 25 ECTS credit points. Intermediate study modules are 60 ECTS credits including the basic studies module. The lower university degree includes basic and intermediate studies in the major subject, plus minor subjects as defined in the curriculum of the degree programme.

The advanced studies are included in the Master's degree. The student must complete advanced studies in the major subject or a corresponding entity of the advanced studies of a degree programme. Advanced studies offer students scientific specific knowledge and prepare for scientific research work.

Advanced studies also include a Master's thesis, known as the *pro gradu*, defining a specific scientific problem, and reporting on the observations, experiments and conclusions carried out in order to solve it. In case a minor subject should be included in the higher university degree, it is specified in the curriculum of the degree programme.

The teaching and learning methods used in the Faculty include attending lectures and demonstrations, reading course literature, and carrying out practical work either at home, in the department, or in the field. Students' work is assessed throughout the year in several different ways, including, for example, book examinations, continuous assessment of assignments, and tests at the end of taught courses.

Requirements for the Master of Science (MSc) degree

a) Advanced studies at least 60 ECTS credits in accordance with the regulations for one of the Faculty's degree programmes (and, where relevant, a specified track)
b) The Master's thesis (*pro gradu*), in the student's major subject, 20–40 ECTS credits.
c) Minor subject studies or language studies

Major subjects

Students' major subject depends on the degree programme and the specialisation field or track. The major subject can be different in the lower degree and the higher degree. In the English Master´s Degree Programmes the tracks and major subjects are following:

MASTER'S DEGREE PROGRAMME	SPECIALISATION FIELD / TRACK	MAJOR SUBJECT
Environmental Sciences	Ecotoxicology	Environmental science
	Spatial and Ecological Interactions	Environmental science
	Quaternary Paleoecology and Environmental Change	Environmental science
Information Technology	Work Informatics	Information systems
	Information security	Networked systems security (?)
	Information security	Cryptography and data security (?)
Embedded computing	Embedded computing	Embedded computing (?)
Bioinformatics	Bioinformatics	Bioinformatics
Master's Degree in Physical Sciences, Astronomy track	Astronomy	Astronomy

Minor subjects

There are compulsory and optional minor studies included in the degree studies. Each degree programme's requirements are specified in its curriculum. Usually the higher university degree does not include any minor subjects. In case a minor subject is required, it should be planned with the academic advisor when making the personal study plan.

Students have the right to study more credits than the minimum degree requirements. Study modules which are more than 12 ECTS credits will be recorded in the degree certificate as a minor subject. To get a minor subject from another specialization field in the Master's Degree Programme in Environmental Sciences a minimum of 25 ECTS credits is needed. Otherwise the studies from another field will be included in the Major subject module.

Language and communication studies

According to the regulations governing the Faculty's degrees and approved by the Faculty Council, all foreign students whose native language is not Finnish have to pass Finnish language courses worth at least 5 ECTS credits. Courses can be freely chosen from those available. Please find more information from the Language Center study guide or from their web site: http://kielikeskus.utu.fi/. It is also possible to study additional language studies, even though they are not included in the curriculum. Especially Finnish language courses are recommended, since knowledge in Finnish is very important when finding employment in Finland. Since the spring 2011 the Language Center also offers a 20 ECTS study module in Finnish language. The module can be included as a minor subject into the MSc. degree. Depending on the curriculum the minor subject can/cannot be included into the minimum of 120 ECTS.

All students with Finnish education background (suomenkielinen peruskoulu) must pass *virkamiesruotsi* (KIRU2321 and KIRU2341) either in their BSc. or MSc. Degree (Valtion virkamieheltä kaksikielisellä kielialueella vaadittava kielitaito siitä annetun lain (424/2003) 6§:n 1 momentin mukaan.) The Finnish students exempt for the Swedish and Finnish course should compensate for the language course credits with their major subject studies.

Personal study plan (HOPS)

Starting from 2005, all students will make a personal study plan. The system of personal study plans increases students' guidance and promotes advancement in studies. In the beginning of the studies the personal study plan is made with the coordinator of the programme. Later, and especially on the issues concerning practical courses and Master´s Thesis, the students should turn to academic advisors on the departments. The personal study plan is not a written agreement on the completion of studies. Instead, it is an indicative plan about the content of the degree and studies included in it. Students can complement and modify this plan during their studies. Students are responsible for keeping, updating and implementing their own personal study plans. A personal study plan may be drawn up electronically (hops.utu.fi) or as a hard copy.

Right to study

Students must register each academic year for attendance or absence in the manner defined by the Rector's Office. Students who are currently registered will be sent a registration letter in the spring to the address recorded in the student record. In case a student fails to register, s/he will lose her/his right to study. If a student wishes to start his/her studies at a later date or continue with them, s/he must literally apply for a new right to study.

According to the Universities Act (556/2005) those students who have started to study in a university in 2005 or later have the right to study for a BSc. degree for 3+2 years and for a Master's Degree 2+2 years. The university must arrange the education to enable the student to complete the degree according to the normative timing.

Four years study time (MSc.) does not include absences that are due to military service, maternity leave or other parental leave of absence. Nor does it include absences less than four semesters, when a student has registered for non-attendance. The University can allow more time to complete the studies, if a student presents a feasible study plan of completing her/his studies. Otherwise a student will lose her/his right to study.

Academic teaching periods

The academic year in the University of Turku is devided into four teaching period in most of the faculties. However, the faculties may decide the starting dates and the lengths of the periods themselves. In the last week of each period there is no teaching. Examinations can be organised also during the last week of period. Examinations and some special courses (such as field courses) can be arranged outside teaching periods.

In the Academic Year 2011-2012 the periods in the faculty are:

I period 29.8.2011 - 21.10.2011 (8 weeks)
II period 24.10.2011 - 23.12.2011 (9 weeks)
III period 9.1.2012 - 9.3.2012 (9 weeks)
IV period 12.3.2012 – 25.5.2012 (11 weeks, no teaching around Easter on 5.4.-9.4.2012)

Participation in teaching

For lecture courses, registration is normally not required. For smaller groups (demonstrations, field courses, etc.) students usually need to register, and for elective or optional courses it may in some cases be necessary to limit the number of those admitted. Detailed information about registration for classes can be found on departmental notice boards or web-sites.
Students' work may be assessed on the basis of continuous assessment (assignments during a course), tests during or following a taught course, or 'book exams' on specified scientific literature.
Following every taught course, at least three opportunities to take or re-take the relevant test will be provided during the following twelve months. In certain, specific cases, admission to the test for a lecture course may also require active participation in the linked demonstrations. If, after 12 months, a student has either not attended the tests or has failed to pass, he or she may be required to report to the examiner in person. The examiner may then either extend the student's right to take the test, or require the student to re-take the course. The timing of book exams can usually be chosen more freely, allowing students to individually pace their own work during the year.
Detailed instructions about registering for tests and examinations can be found on departmental notice boards or web-sites. Information concerning the names of examiners responsible for different courses and examinations is available in the published degree programme regulations or from the relevant department office.
All results for completed study units (courses, examinations, thesis) are recorded in 'OPSU', the University's computerised student register, either by the department office or by the examiner. Students may obtain an English transcript of their current status in OPSU via e-mail from the address transcript@utu.fi, NettiOpsu (→ credits → pdf-transcript) or by ordering it from the Student Services or the department office.

Grading

All courses are measured in credits, one credit point (abbreviated *op* in Finnish) referring to an input of approximately 27 overall hours of work by the student. This workload includes all the requirements for a course: not only attending lectures and practicals, but the time spent studying privately as well. By studying full time (40 hours/week) a student should complete 60 ECTS/year to meet the normative timing of studies.

Examinations, tests and assignments may be assessed either on a PASS/FAIL basis, or on the following scale:

5 = Excellent
4 = Very good
3 = Good
2 = Satisfactory
1 = Sufficient
0 = Fail

Grades are determined and rounded up as follows:

5	4.50 to 5	Excellect
4	3.50 to 4.49	Very good
3	2.50 to 3.49	Good
2	1.50 to 2.49	Satisfactory
1	1 to 1.49	Sufficient

Where a study unit comprises several distinct sections, they may be differentially weighted in the assessment for the unit as a whole. Test and examination results should normally be published within two weeks, unless special arrangements have been made. Students have the right to be provided upon request an explanation of the grounds for the assessment.

Master's Thesis

The Master's thesis for the MSc degree (*pro gradu*) is a written report of research carried out in the student's major subject, comprising laboratory work, field work, and/or the study of relevant scientific literature. The thesis should demonstrate that the author is capable of dealing competently with the research material and applying appropriate research methodology, is familiar with the relevant literature, and can present the results in accordance with the conventions of scientific writing. The topic for the thesis should be agreed in consultation with a professor or other senior member of staff from the subject concerned.
The Master's thesis should be at least 20 and at most 40 credits. It can be written in Finnish, Swedish or English. It can also be written in some other language with the permission of the Dean of the Faculty.
When the thesis is ready, a hard covered copy of it must be submitted to the department office (in some cases more copies may be needed). As specified in the regulations, a summary of the thesis must be prepared. A copy of this summary is bound in the thesis immediately after the title page; an additional separate copy is submitted to the department office. The department will then appoint two (or if necessary more) examiners.
After submitting the Master's thesis, the student must write a maturity essay (in Finnish, *kypsyysnäyte*), in which the student writes an essay in examination conditions on a topic relating to his/her thesis. Finnish nationals write this essay in their own first language; foreign students write it in the same language as the Master's thesis. The maturity essay must show the student's ability in academic writing and his/her thorough knowledge of the topic of the thesis.
The Master's thesis must be graded within two months after submission to the department. In case the thesis is submitted in June, July or August, it will be graded during the following September at the latest. The pro gradu thesis is assessed on a seven-point scale: approbatur (pass), lubenter approbatur, non sine laude approbatur, cum laude approbatur, magna cum laude approbatur, eximia cum laude approbatur, and laudatur (distinction). The department informs the Faculty about the approval of the Master's thesis.
The grading of the Master's thesis will be considered as part of the advanced studies by changing the seven-point scale into 1-5 point scale as follows: approbatur = 1, lubenter approbatur = 1.667, non sine laude approbatur = 2.333, cum laude approbatur = 3, magna cum laude approbatur = 3.667, eximia cum laude approbatur = 4.333, and laudatur = 5.

Completing the degree and obtaining a degree certificate

Once a student has fulfilled all the requirements for the degree, in order to obtain the degree certificate, it is necessary that all the student's completed study units (tests and examinations, fieldwork, and the thesis) have been registered in OPSU and, where relevant, incorporated into the appropriate Module. **To ensure that this process is complete, students should consult the department or the coordinator of the programme**. The student then submits to the Faculty office a degree certificate application form and a transcript of studies. The decisions about any course compensations or changes made into the degree requirements must also be attached. The time needed for processing a degree certificate application is normally about two weeks.
In order to obtain a degree certificate, the student **must** be registered as currently attending the University at the time when the certificate is issued.

The degree certificate

The certificates state the student's Degree Programme, major subject and minor subjects, and track, where relevant. The total amount of studies completed will be stated in ECTS credits (op), including relevant studies completed elsewhere and incorporated into the Finnish degree. The credits completed are also listed and assessed separately for the student's major and for all minor subjects. Any study units outside these categories which are less than 12 ECTS credits will be listed together on the degree certificate as 'Other Studies', with the number of credits but no other information. The certificate will also state the grade awarded for the Master's thesis.
The degree certificate has two appendices. One is the transcript of records, which will list the student's completed study units as recorded in OPSU, and will also state the title of the Master's thesis. The other is the Diploma Supplement, an appendix designed for international purposes. It is a document developed by the European Commission, Council of Europe and UNESCO for facilitating the international recognition and comparison of degrees. This appendix contains information on the university awarding the degree, on the studies and completed courses referred to in the degree certificate, on the qualification obtained through the studies, as well as on the level and status of the degree in the international educational system.

Statutes

The regulations governing the Faculty's degrees and its administration are contained in statutes which are either national or apply specifically to the University of Turku or the Faculty of Mathematics and Natural Sciences. These documents are all public and may be consulted, but not all of them are available in English. In the case of any problem requiring reference to the statutes, foreign students are advised to apply for help from their department office, the Faculty office, or the University's International Office.
The University Act is available at the website http://www.finlex.fi/fi/laki/kaannokset/ (2005) and The Government Decree on University Degrees at http://www.finlex.fi/fi/laki/kaannokset/2004/en20040794.pdf

Transfer of credits

If the student has previous studies that are not included in his/her BSc level degree, the studies may be transferred into the Finnish system. International credit transfers are made wherever possible by means of the European Credit Transfer System (ECTS). One Finnish credit (op) equals one ECTS credit. In many cases, incoming students in this situation will need to complete less than 120 ECTS studies in order to obtain the Finnish MSc degree. Even when credits are transferred in to a degree, the degree programme must reach its aims that are stated in the regulations governing the Faculty's degrees.

The transfer of credits can be either *replacing* or *including* credits. *Replacing* credits means that it is possible to replace certain study modules in the curriculum with modules passed in another university. In this case the content of the study modules should be the same. *Including* credits means that the study modules passed in another university are included in the degree as optional studies.

Right of study in other Faculties and Institutes of Higher Education

It is possible for a student to select studies in other scientific institutes or art academies of higher education in Finland. The University of Turku has concluded a so called JOO-agreement with all Finnish universities, which means that study modules in another university are free of charge for an enrolled student. An application for JOO-studies can be filled electronically at www.joopas.fi after which the application is processed by the study councellor of the Faculty in the home university and then by the processing official in the taget university. The permission is not given, in case it is possible to study similar study modules at the University of Turku, or the studies are not included in the minimum degree requirements. Instructions to use the service are availabel at https://haku.joopas.fi/litu/en/help/opiskohje.pdf
In the field of information technology, education and research in Turku is coordinated by TUCS (Turku Centre for Computer Science). IT-related advanced level courses at Åbo Akademi University are also applied for through joopas-service. To apply for courses held by the Turku School of Economics and Business Administration are
Students can also study part of their degree in a foreign university through an exchange programme such as ERASMUS or NORDPLUS. Students can find out more information about student exchange from the International Affairs Office The Faculty of Mathematics and Natural Sciences recommends that the students of the Master's Degree Programmes would participate in the student exchange for one semester at the most.

The aims of the Master's Degree Programme in Environmental Sciences

The aim of the Master's Degree Programme in Environmental Sciences is to offer:

1) A multidisciplinary and extensive view of environmental sciences and their socio-economical connections;
2) Specialization and profound scientific knowledge in a selected field of environmental sciences;
3) Advanced knowledge in global environmental issues and basic knowledge in multilateral environmental agreements;
4) Advanced scientific knowledge and practical skills in data management and environmental analysis;
5) Ability to collect, critically evaluate and use research material;
6) Competence for postgraduate studies in the selected field.

MASTER'S DEGREE PROGRAMME IN ENVIRONMENTAL SCIENCES

The Master's Degree Programme in Environmental Sciences educates environmental specialists that hold a comprehensive view of environmental issues. The programme covers different interdisciplinary specialization fields that are managed by the Departments of Geography and Geology; and Biology. As a cooperation of these participating units, the programme offers specialization studies in:

- Ecotoxicology
- Spatial and Ecological Interactions
- Quaternary Paleoecology and Environmental Change

All students are given the basic knowledge in environmental problems and multilateral environmental agreements, and they also achieve advanced scientific knowledge and practical skills in data management and environmental analysis. Education is given in English, and the students of this international programme learn to work together with associates from different countries and cultures. Graduates of the programme are competent in basic and applied research, and will also find employment in tasks related to environmental assessment and administration as well as in commercial activities and economic life. The Master of Science (MSc) degree also gives eligibility for scientific postgraduate studies.

Structure of Studies

The applicants choose the preferred specialization field already in the application. The students are selected directly into the specialization fields, and become registered in the coordinating Department.

The MSc degree is attained in two years. The studies encompass many aspects of environmental sciences and consist of book examinations, lectures, seminars and experimental field and laboratory courses. In the beginning of the programme, each student will formulate an individual study plan with the help of an advisor. The curriculum includes common studies (minimum 25 ECTS) and advanced studies in the specialization field (95 credits including an extensive 40 ECTS Master's Thesis). The students may also study courses from the other specialization fields in the programme (or other programmes even in other universities) to broaden their perspective. If the student wishes studies from another specialization field in the programme to be marked separately as a minor subject in the transcript of records and the degree certificate, a minimum of 25 ECTS is required.

In the Finnish system, all courses are measured in credits, opintopiste (op) in Finnish. One credit refers to an input of approximately 27 hours of work for the attainment of set objectives for a course. At the University of Turku one Finnish credit equals 1 ECTS credit. In this curriculum credits are marked as ECTS credits, which are used as a translation of opintopiste.

Entrance qualifications

Both foreign and Finnish students admitted to the programme must hold a degree equivalent to a Bachelor's degree from a Finnish university. Finnish ammattikorkeakoulu degrees can also be considered sufficient when combined with possible additional Bachelor's level studies (max. 60 ECTS). These additional studies are not included in the Master of Science degree. The degree should be in an applicable field e.g. biology, biochemistry, chemistry, geography, geology, environmental science or earth science, and correspond to 180 ECTS at an institution of higher education.

The applicants choose the preferred pecialization field already in application, and the students are admitted directly into the specialization fields. Student selection is based on the student's educa-

tional background and reasoning for choosing the particular specialization field. The specialization fields in the Master's Degree Programme are not offered as minor subjects for students in other degree programmes.

Foreign applicants must pass an internationally recognized English language test, either TOEFL (Test of English as a Foreign Language) with minimum score of 575 (paper-based test) or 232 (computer-based test) or 90 (internet based test) or IELTS (International English Language Testing Service) with an overall band score of 6.5 and no individual scores below 5.5. Only score reports received directly from the testing center will be accepted.

Specialization fields

The studies in each field begin with common studies which mainly are obligatory for all students in the Master's Degree Programme in Environmental Sciences. However, there are a few exceptions:

- The students in the field Spatial and Ecological Interactions may compensate the course Introduction to Geoinformatics (MAAN6053) with Literature in Geoinformatics (MAAN6453, Jones C. (1997) Geographical information systems and computer cartography)
- All foreign students whose native language is not Finnish must pass Finnish language courses (KIFF0003) worth at least 5 credits. Finnish students are excused for the course and may instead complete their common studies with courses on their specialization field.
- All students with Finnish education background (suomenkielinen peruskoulu) must pass "virkamiesruotsi" (KIRU2321 and KIRU2341) either in their BSc. or MSc. Degree (Valtion virkamieheltä kaksikielisellä kielialueella vaadittava kielitaito siitä annetun lain (424/2003) 6§:n 1 momentin mukaan.)

Please also note that previous knowledge or supplementary studies are required in statistics.

Ecotoxicology

The field focuses on mechanisms of toxicity. One of the major foci of research is investigating how environmental adaptations at the genetic and physiological (individual) level are disturbed by environmental contamination. Specifically, effects of oxidative stresses on gene expression are investigated using the Baltic Sea and the Fennoscandian shield as major research areas. Since oxidative stress is studied the research comprises, e.g., metal toxicity, toxicity of organic compounds (e.g. PAH), oil pollution and uv-radiation. The main taxonomical groups investigated are fish, amphibians and birds but suitable work on plants and prokaryotes is included. The students are expected to integrate into the existing research groups within aquatic toxicology, conservation genetics or environmental biology of birds to carry out their thesis work.

The teaching given represents principles required for understanding how environmental contamination may affect environmental responses of individuals, how individual responses can be transmitted to the population and ecosystem level via genetic mechanisms and what are the chemical methods used for determining and pathways involved in exerting the effects of environmental contamination.

An indication of the role of University of Turku in ecotoxicology is that the chief editor of Aquatic Toxicology works in the Department of Biology. In addition the recent active research has been concentrated in finding out the effects of environmental contamination on birds and their invertebrate prey. Future foci include conservation genetics and the influence of environmental contaminants on the genetic mechanisms of local adaptations.
Coordinating unit: Section of Genetics and Physiology (Dept. of Biology)

Spatial and Ecological Interactions

Students who take spatial and ecological interactions as their specialisation field are expected to have a keen interest on spatial distribution, dynamics and interactions of natural and human-made entities, like species, vegetation types, habitats, land uses and land cover patterns. Students are trained in applied skills of spatial analysis techniques in various geographical and ecological research applications. In addition, the curriculum addresses important GI-science processes in the society, such as development of spatial data infrastructures, policies and services with regard to environmental information. In this interdisciplinary specialisation, research on taxonomy, ecology, biogeography and landscapes are combined with the use of remote sensing, image processing, Geographical Information Systems (GIS) and digital cartography. Students are encouraged to define their Master's thesis topics as part of the existing multidisciplinary research teams at the University of Turku, utilising the facilities of the Laboratory of Computer Cartography (www.utu-lcc.utu.fi <http://www.utu-lcc.utu.fi/>). Relevant research teams work on various topics of ecological, coastal, landscape, fluvial and development studies in arctic, boreal and tropical environments. Coordinating units: Section of Geography (Dept. of Geography and Geology) and section of Biodiversity and Environmental Science (Dept. of Biology)

Quaternary Paleoecology and Environmental Change

Within this interdisciplinary field, paleogeological research is combined with the Biological Museum's extensive knowledge in the taxonomy of animal and plant groups. Education represents the core area in paleoecological research and focuses on environmental history and quaternary geology, including analytical physical and chemical methods as well as practicals in the taxonomy of different subfossil groups.

Being rich in lakes and marshes and extensive glacial record, Finland is traditionally known as an area with exceptionally favourable chances to do paleoecological research. At the University of Turku, paleoecological education and research is partly directed to the unique Finnish Archipelago and to the Kevo Subarctic Research Center in the Finnish Lapland.

Paleoecological research has a central role in several international research programmes, including the past Global Change (PAGES) of the International Geological Correlation Programme (IGCP), European Science Foundation in Holocene Climatic Variability (Holivar) and International Quaternary Association in Commission of Human Evolution Paleoecology. All these projects aim in increasing quantitative knowledge in the global change of the earth's recent history, to make it possible to estimate changes in the atmosphere caused by human action.
Coordinating unit: Section of Geology (Dept. of Geography and Geology)

NORMATIVE TIMING OF THE STUDIES

		period / year of study							
	Compulsory Common Studies, 25 ECTS	**1/1**	**2/1**	**3/1**	**4/1**	**1/2**	**2/2**	**3/2**	**4/2**
YMPS6046	Introduction to Environmental Sciences at the University of Turku, 2 ECTS	x	x						
MAAN6001	Introduction to geoinformatics, 4 ECTS		x						
YMPS6047	Environmental Agreements and Project Management, 2 ECTS	x							
YMPS6043	Conservation Biology, 2–4 ECTS	x							
GEOL1112	Resources of the Earth, 2 ECTS		x						
YMPS6048	Fundamentals of Environmental Science, 4 ECTS	x	x	x	x				
YMPS1039	Research Seminar in Environmental Sciences, 4 ECTS			x				x	
KIFF0003	Finnish for Foreigners: Intensive Beginners' Course, 5 ECTS	x	x						

ECOTOXICOLOGY

		period / year of study							
	Compulsory Studies, 64–74 ECTS	**1/1**	**2/1**	**3/1**	**4/1**	**1/2**	**2/2**	**3/2**	**4/2**
ESCE0003	Seminars in Toxicology, 4 ECTS	x	x	x	x				
ESCE0004	Final Examination in Toxicology, 10–20 ECTS								x
ESCE0005	Methods in Molecular and Genotoxicology, 4 ECTS			x					
ESCE0006	Modelling and Evaluating Toxicological Data Sets, 4 ECTS				x				
ESCE0008	Principles of Ecotoxicology, 2 ECTS	x							
ESCE0010	Master's Thesis in Ecotoxicology, 40 ECTS					x	x	x	x
	Optional Studies, 21–31 ECTS	**1/1**	**2/1**	**3/1**	**4/1**	**1/2**	**2/2**	**3/2**	**4/2**
ESCE0001	Readings in Environmental Physiology of Animals, 6 ECTS			x					
ESCE0002	Readings in Ecology, 6 ECTS					x			
ESCE0011	Readings in Environmental Chemistry, 6 ECTS						x		
ESCE0013	Practicals in Ecotoxicology	whenever offered							

SPATIAL AND ECOLOGICAL INTERACTIONS

		period / year of study							
	Compulsory Studies, 24 ECTS	**1/1**	**2/1**	**3/1**	**4/1**	**1/2**	**2/2**	**3/2**	**4/2**
EKOL3132	Advanced issues in Biodiversity Research, 4 ECTS			x					
EKOL3141	Advanced Conservation Ecology, 6 ECTS (even years)	x	x			x	x		
MAAN6451	Methods in Geographical Information Systems (GIS) (v), 7 ECTS		x						
MAAN6452	Methods in remote sensing and image processing (v), 7 ECTS				x				

	Compulsory Alternative Studies, 52 ECTS	**1/1**	**2/1**	**3/1**	**4/1**	**1/2**	**2/2**	**3/2**	**4/2**
EKOL3134	Use of GIS and Remote Sensing in Studying Biodiversity, 2 ECTS (even years) *or*				x				x
EKOL3135	Biodiversity Informatics, 2 ECTS (uneven years)				x				x
MAAN7352	Environmental management, 5 ECTS (even years) *or*				x				x
MAAN7501	Development and Geography, 5 ECTS								
MAAN7351	Landscape ecology and GIS, 5 ECTS (uneven years) *or*				x				x
MAAN7601	Remote sensing of the environment, 5 ECTS (even years)				x				x
MAAN7091	Thesis in Geography, 40 ECTS *or*					x	x	x	x
EKOL3012	Master's Thesis, 40 ECTS					x	x	x	x

		period / year of study							
	Optional Studies 19 ECTS	**1/1**	**2/1**	**3/1**	**4/1**	**1/2**	**2/2**	**3/2**	**4/2**
YMPS6002	Environment and Development, 2 ECTS (next time in 2012)		x						
EKOL3001	Evolutionary biology research project, 5–15 ECTS		x	x	x				
EKOL3008	Final Examination 1, Research Track, 10 ECTS	according to personal study plan							
EKOL3009	Final Examination 2, Research Track, 10 ECTS								
EKOL2311	Geographical plant ecology, 4 ECTS		x				x		
MAAN7802	Geography guest seminar, 2 ECTS	whenever offered							
MAAN7663	GIS and society, 4 ECTS					x			
MAAN7891	Practical training, 2–6 ECTS	during the summer							
MAAN7655	Readings in applied geoinformatics, 5 ECTS	according to personal study plan							
MAAN6453	Readings in geoinformatics, 2 ECTS								
MAAN7355	Readings in regional environmental research, 5 ECTS								
EKOL3150	Tropical Plant Families, 4 ECTS (uneven years)						x		
EKOL3004	Visitor seminar, 2 ECTS	whenever offered							

QUATERNARY PALEOECOLOGY AND ENVIRONMENTAL CHANGE

		period / year of study							
	Compulsory Studies, 77 ECTS	**1/1**	**2/1**	**3/1**	**4/1**	**1/2**	**2/2**	**3/2**	**4/2**
GMAA4805	Quaternary Geology, 6 ECTS	x	x	x					
GMAA4735	Environmental Archaeology, 2 ECTS			x	x				
GMAA4814	Glacial Stratigraphy, 5 ECTS				x				
GMAA4806	Physical and Chemical Methods of Lacustrine and Marine Sediments, 5 ECTS							x	
GMAA4734	Environmental History: Natural Sciences Perspective to Anthropogenic Influence, 4 ECTS			x	x				
GMAA4736	Laboratory Practical Works in Glacial and Quaternary Geology, 8 ECTS		x	x					
GMAA4722	Lake and sea sediment surveys, 7 ECTS					x	x		
GMAA4675	Thesis, 40 ECTS					x	x	x	x

		period / year of study							
	Optional Studies	**1/1**	**2/1**	**3/1**	**4/1**	**1/2**	**2/2**	**3/2**	**4/2**
GMAA4732	Quaternary Environmental Changes, 2 ECTS		x	x					
GMAA4730	Practical Image Analysis in Quaternary Paleolimnology, 2 ECTS						x		

CURRICULUM 2011–2012

Compulsory Common Studies		**25 ECTS**
YMPS6046	Introduction to Environmental Sciences at the Univ.of Turku	2 ECTS
MAAN6001	Introduction to geoinformatics	4 ECTS
YMPS6047	Environmental Agreements and Project Management	2 ECTS
YMPS6043	Conservation Biology	2 ECTS
GEOL1112	Resources of the Earth	2 ECTS
YMPS6048	Fundamentals of Environmental Sciences	4 ECTS
YMPS1039	Research seminar in Environmental Sciences	4 ECTS
KIFF0003	Finnish for Foreigners: Intensive Beginners' Course	5 ECTS

Optional Common Studies		
YMPS5009	Introduction to futures studies	5 ECTS
YMPS5007	Sustainable futures: environment, culture, society, economy	3 ECTS
YMPS5008	Sustainable futures: The future of the globalizing world	3 ECTS

ECOTOXICOLOGY

Compulsory Studies		**64–74 ECTS**
ESCE0003	Seminars in Toxicology	4 ECTS
ESCE0008	Principles of Ecotoxicology	2 ECTS
ESCE0005	Methods in Molecular and Genotoxicology	4 ECTS
ESCE0006	Modelling and Evaluating Toxicological Data Sets	4 ECTS
ESCE0004	Final Examination in Toxicology	10–20 ECTS
ESCE0010	Master's Thesis in Ecotoxicology	40 ECTS

Optional Studies **21–31 ECTS**

In addition to the common studies (25 ECTS) and the Compulsory Studies in the specialization field the students must study optional courses for the total of 120 ECTS required for the MSc. degree. Optional courses organized by UTU or other Finnish universities but not mentioned here are also possible but have to be agreed with the academic advisor in the field.

ESCE0001	Readings in Environmental Physiology of Animals	6 ECTS
ESCE0002	Readings in Ecology	6 ECTS
ESCE0011	Readings in Environmental Chemistry	6 ECTS
ESCE0013	Practicals in Ecotoxicology	5–15 ECTS

SPATIAL AND ECOLOGICAL INTERACTIONS

Compulsory Studies		**24 ECTS**
MAAN6451	Methods in Geographical Information Systems (GIS) (v)	7 ECTS
MAAN6452	Methods in remote sensing and image processing (v)	7 ECTS
EKOL3141	Advanced Conservation Ecology	6 ECTS
EKOL3132	Advanced issues in Biodiversity Research	4 ECTS

Alternative Compulsory Studies **52 ECTS**

The student must pass MAAN7351 or MAAN7601; and EKOL3134 or EKOL3135; and MAAN7352 or MAAN7501; and MAAN7091 or EKOL3012.

EKOL3134	Use of GIS and Remote Sensing in Studying Biodiversity	2 ECTS
EKOL3135	Biodiversity Informatics	2 ECTS
MAAN7352	Environmental management	5 ECTS
MAAN7501	Development and geography	5 ECTS
MAAN7351	Landscape ecology and GIS	5 ECTS
MAAN7601	Remote sensing of environment	5 ECTS
MAAN7091	MSc Thesis in Geography	40 ECTS
EKOL3012	Master's Thesis	40 ECTS

Optional Studies **19 ECTS**

In addition to the common studies (25 ECTS) and the Compulsory Studies in the specialization field the students must study optional courses for the total of 120 ECTS required for the MSc. degree. Optional courses organized by UTU or other Finnish universities but not mentioned here are also possible but have to be agreed with the academic advisor in the field.

EKOL2311	Geographical plant ecology	6 ECTS
EKOL3150	Tropical plant families	4 ECTS
MAAN7663	GIS and society	4 ECTS
YMPS6002	Environment and Development	2–6 ECTS
MAAN7802	Geography guest seminar	2 ECTS
EKOL3004	Visitor seminar	2 ECTS
MAAN7891	Practical training	2–6 ECTS
EKOL3008	Final examination	10 ECTS
EKOL3009	Final examination 2	10 ECTS
MAAN7355	Readings in regional environmental research	2–8 ECTS
MAAN6453	Readings in geoinformatics	2 ECTS
MAAN7655	Readings in applied geoinformatics	5 ECTS

QUATERNARY PALEOECOLOGY AND ENVIRONMENTAL CHANGE

Compulsory Studies **77 ECTS**

GMAA4805	Quaternary Geology	6 ECTS
GMAA4814	Glacial stratigraphy	5 ECTS
GMAA4806	Physical and chemical methods of lacustrine and marine sediments	5 ECTS
GMAA4736	Laboratory practical works in glacial and Quaternary geology	8 ECTS
GMAA4735	Environmental Archaeology	2 ECTS
GMAA4734	Environmental History: Natural Sciences Perspective to Anthropogenic Influence	4 ECTS
GMAA4675	Thesis	40 ECTS

Optional Studies **18 ECTS**

In addition to the common studies (25 ECTS) and the Compulsory Studies in the specialization field the students must study optional courses for the total of 120 ECTS required for the MSc. degree. Optional courses organized by UTU or other Finnish universities but not mentioned here are also possible but have to be agreed with the academic advisor in the field.

GMAA4730	Practical image analysis in Quaternary paleolimnology	2 ECTS
GMAA4732	Quaternary environmental changes	2 ECTS

COURSE DESCRIPTIONS IN ALPHABETHICAL ORDER

EKOL3141 Advanced Conservation Ecology 6 ECTS
Subject: Ecology
Person(s) in charge: professor Kai Norrdahl, kai.norrdahl@utu.fi
Objectives: Students have a good understanding of the ecological aspects of selected conservation issues.
Content: Lectures and research articles on central themes in conservation ecology, such as fragmentation and habitat loss, connectivity, and population viability.
Languages of instruction: English
Teaching methods: Lectures, Seminar.
Further information on teaching methods: Participation in classroom work, seminar and writing an essay.
Modes of study: Participation in classroom work + essay + seminar.
Evaluation: 1-5
Offering information: for JOO students
Further information: Arranged in even years. This course is linked to FYGE5330 Conservation Genetics under the name: Conservation Biology.

EKOL3132 Advanced issues in Biodiversity Research 4 ECTS
Subject: Ecology
Person(s) in charge: Professor Pekka Niemelä, pekka.niemela@utu.fi
Objectives: To familiarize students with currently topical issues in biodiversity research.
Content: Lectures and seminars on selected topics in the field.
Languages of instruction: Finnish
Further information on teaching methods: Lectures and seminars, 24h
Planned times for teaching: Period III
Modes of study: Participation in classroom work + oral presentation.
Evaluation: Pass/fail
Recommended year of study: 4. year spring, 5. year spring.
Offering information: for JOO students

EKOL3135 Biodiversity Informatics 2 ECTS
Subject: Ecology
Person(s) in charge: Lecturer Hanna Tuomisto, hanna.tuomisto@utu.fi
Objectives: After the course the student will have an overview of the tools, procedures and analysis techniques developed for handling large amounts of data on species and their distribution. The student will also understand the benefits and problems in sharing biodiversity data and be familiar with some data sharing initiatives.
Content: Lectures on informatics tools, metadata, data sharing and the use of museum and observational databases in research. Practicals on data base design and species distribution modelling. Student presentations on data sharing portals.
Languages of instruction: English
Teaching methods: Lectures.
Further information on teaching methods: + student presentations
Modes of study: Participation in classroom work + oral presentation.
Further information on modes of study: + written reports on the practicals
Evaluation: 1-5
Offering information: for JOO students
Further information: The course is only given in uneven years.

YMPS6043 Conservation Biology 2 ECTS
Subject: Environmental Science
Person(s) in charge: Timo Vuorisalo, timovuo@utu.fi
Objectives: This course familiarizes students with fundamentals in conservation biology.

Content: The course includes lectures on global extinction patterns, consequences of small population size, species invasions, habitat and population fragmentation and conservation planning.
Languages of instruction: English
Teaching methods: Lectures 24 h.
Modes of study: Participation in classroom work + written exam.
Further information on modes of study: Active participation to lectures and successful completion of the exam.
Evaluation: 1-5
Offering information: for JOO students

MAAN7501 Development and geography 5 ECTS
Subject: Geography
Person(s) in charge: Jussi Jauhiainen
Objectives: Student learns to examine critically the relationship between development and geography and the significance of geographical knowledge in development and its evaluation.
Content: There is examined the relations between development and geography. These will be approached through the current research projects in which the department is involved in.
Languages of instruction: English
Teaching methods: Lectures, Seminar.
Modes of study: Seminar + participation in classroom work.
Further information on modes of study: Active participation to lectures and seminars.
Evaluation: 1-5
Further information on recommended year of study: FM 1 or FM 2.
Previous studies: Recommended previous studies
MAAN6381 Globaalin kehitysproblematiikan kirjallisuus (p).
Offering information: for JOO students
Study materials
Material will be delivered during the course.
Further information: The course is organised every second year - not offered in 2011-2012 (next time 2012-2013).

YMPS6002 Environment and Development 2–6 ECTS
Subject: Environmental Science
Person(s) in charge: Timo Vuorisalo, timovuo@utu.fi (Dept. of Biology, Environmental Sciences)
Objectives: To familiarize students with environmental issues from the perspective of developing countries.
Content: Measurement of environmental sustainability, population growth, energy issues, food production, environmental pollution, participation of developing countries in international environmental cooperation.
Teaching methods: Lectures 20 h.
Further information on teaching methods: lectures and seminars: Introductory lectures, student presentations on specific topics (2 ects), own presentation in English (2 ects), book exam (2 ects).
Modes of study: In Finnish: Study journal / learning diary.
Evaluation: 1-5
Further information: Next lectures study year 2012-2013 period 2.

YMPS6047 Environmental Agreements and Project Management 2 ECTS
Subject: Environmental Science
Person(s) in charge: Professor Timo Vuorisalo, timovuo@utu.fi
Objectives: To familiarize students with the development and rules of international environmental law, and on practical problems of environmental projects in developing countries.
Content: The course includes lectures on the formation, structure and importance of international environmental agreements, their historical background and current importance in international cooperation. Analysis of environmental projects in developing countries will be based on case studies.
Languages of instruction: English
Teaching methods: Lectures.

Further information on teaching methods: Lectures
Modes of study: Participation in classroom work + exercise(s).
Further information on modes of study: 80% participation to lectures, course reports.
Evaluation: 1-5
Recommended year of study: 1. year autumn, 1. year spring.
Offering information: for JOO students
Further information: Organization responsible: Dept. of Biology, Environmental Sciences

GMAA4735 Environmental Archaeology 2 ECTS
Subject: Quaternary Geology
Person(s) in charge: Prof. Timo Vuorisalo, timovuo@utu.fi
Objectives: The course aims to provide an introduction to archaeological methods and to the importance of environmental and biological data for archaeological research.
Content: The recommended textbook is Dincauze, D.F. 2000: Environmental Archaeology. Principles and Practice. Cambridge University Press.
Further information on teaching methods: Independent reading for the book exam.
Modes of study: Written exam.
Further information on modes of study: Successful completion of the examination
Evaluation: 1-5
Offering information: for JOO students

GMAA4734 Environmental History: Natural Sciences Perspective to Anthropogenic Inf nce 4 ECTS
Subject: Quaternary Geology
Person(s) in charge: Prof. Timo Vuorisalo, timovuo@utu.fi.
Objectives: The course aims to study human impact on the physical and biological environment from prehistory to present.
Content: The recommended textbook is Goudie, A. 2005: The Human Impact on the Natural Environment. 6th ed. Blackwell Science.
Further information on teaching methods: Independent reading for the book exam.
Modes of study: Written exam.
Further information on modes of study: Successful completion of the examination
Evaluation: 1-5
Offering information: for JOO students

MAAN7352 Environmental management 5 ECTS
Subject: Geography
Person(s) in charge: Sanna Mäki
Objectives: The students understand how administrative, legal, political and economic structures inf nce environmental planning. They will learn the basics of ecosystem approach and adaptive management and their application in environmental management.
Content: ADMINISTRATIVE FRAMEWORK: global agreements, regional (EU), national (Finnish environmental administration) and local (ELY-centres, municipalities) administration and stakeholder participation in environmental management.
SCIENTIFIC APPROACHES APPLIED IN PLANNING AND MANAGEMENT: Ecosystem approach and Adaptive management
CASE STUDIES: Every year a case example is defined in cooperation with institutions involved with the course.
COURSE OUTLINE: Introductory lectures, visits to or visitors from central organisations related to environmental management, field trip and workshops.
Languages of instruction: English
Teaching methods: Lectures, Group work, Independent work.
Planned times for teaching: Period IV
Modes of study: Participation in classroom work + project / practical work + study journal / learning diary.

Further information on modes of study: Lectures, visits, group work & independent work, short presentations
Evaluation: 1-5
Further information on recommended year of study: MSc 1 or 2
Further information on previous studies: Participants should have BSc degree or equivalent studies completed and specialisation in geography or environmental studies. These criteria are applied when delimiting the number of participants (max. 20 participants).
Offering information: for JOO students
For international students in other institutions of higher education in Turku
Further information: The course is organised every second year.

EKOL3008 Final examination 10 ECTS
Subject: Ecology
Person(s) in charge: Professor Pekka Niemelä Pekka.Niemela@utu.fi
Objectives: To ensure the student's adequate knowledge on the literature of the field.
Content: The content of the books/articles studied is chosen together by the student and the professor.
Modes of study: Written exam.
Further information on modes of study: Successful completion of the examination
Evaluation: 1-5
Offering information: for JOO students

EKOL3009 Final examination 2 10 ECTS
Subject: Ecology
Person(s) in charge: Professor Pekka Niemelä Pekka.Niemela@utu.fi
Objectives: To ensure the student's adequate knowledge on the literature of the field.
Content: The content of the books/articles studied is chosen together by the student and the professor.
Modes of study: Written exam.
Further information on modes of study: Successful completion of the examination
Evaluation: 1-5
Offering information: for JOO students

ESCE0004 Final Examination in Toxicology 10–20 ECTS
Subject: Environmental Sciences
Person(s) in charge: Professor Mikko Nikinmaa, miknik@utu.fi
Objectives: To ascertain that the students have knowledge on toxicological literature.
Content: The content of the books determines the area covered.
Languages of instruction: English
Teaching methods: Independent work.
Further information on teaching methods: Examination of books chosen together by the student and the professor in charge.
Modes of study: Written exam.
Further information on modes of study: Successful completion of the examination.
Evaluation: 1-5
Recommended year of study: 2. year spring.
Offering information: for JOO students
Further information: Dept. of Biology, Section of Genetics and Physiology

KIFF0003 Finnish for Foreigners: Intensive Beginners' Course 5 ECTS
Subject: Language Centre/Finnish for Foreigners
Person(s) in charge: Pirkko Hölttä (autumn semester), Päivi Paukku (spring semester)
General description: This course is intended only for degree students of the University of Turku. The course is integrated in nature and covers all the different areas of linguistic skills. In addition to pronunciation and grammar, the course offers tuition in speaking, written work, and listening and

reading comprehension. Special emphasis will be placed on active communicational skills. In addition to attending the classes, participants must also be prepared to study a lot independently.
Objectives: After the course the student can communicate in simple and routine tasks requiring a simple and direct exchange of information on familiar and routine matters. He/she can e.g. briefly describe events and activities. The student understands the main points in short messages, announcements and stories. He/she can follow speech which is slow and carefully articulated. The student can write short and simple texts on topics which are familiar or of personal interest. He/she can understand short texts that consist of frequent everyday or job-related language.
Content: Themes:
greetings, introducing oneself, countries, languages and nationalities; the seasons and weather, months and days of the week; numbers, expressing time ; colours and other adjectives; home and living; family and relatives; food and eating; shopping: buying and paying; travelling and vehicles; work and professions.
Structures:
vowel harmony; the most common noun types; the genitive stems and consonant gradation; possessive structure; the verb types and conjugation in the present tense; asking questions and responding to them; the use of auxiliary verbs with the main verbs; partitive singular; the local cases in the singular form.
Languages of instruction: English, Finnish
Teaching methods: Tutorials 60 h, Independent work 60 h.
Further information on teaching methods: Midterm examination 2 h, final exam 2 h.
Modes of study: In Finnish: Participation in classroom work + exercise(s) + midterm examination + written exam.
Evaluation: 1-5
Evaluation criteria: Active participation, classroom work, exercises, midterm and final examination.
Recommended year of study: 1. year autumn, 1. year spring.
Further information on previous studies: No previous studies.
Study rights limitations
Available only for
major subject students, minor subject students and graduate students
Further information on prerequisites and recommendations: The course is intended for degree students of the University of Turku.
Study materials
Gehring, S. & Heinzmann, S. 2010. Suomen mestari 1. Saarijärvi 2010.

YMPS6048 Fundamentals of Environmental Sciences 4 ECTS
Subject: Environmental Science
Person(s) in charge: Professor Timo Vuorisalo, timovuo@utu.fi
Objectives: The book provides updated information on global environmental problems.
Content: Miller G. Tyler Jr: Living in the Environment. Principles, Connections and Solutions. Thomson, Brooks/Cole, 2005 (or more recent edition).
Languages of instruction: English
Teaching methods: Independent work.
Further information on teaching methods: Independent work
Modes of study: Written exam.
Evaluation: 1-5
Offering information: for JOO students
Study materials
Miller G. Tyler Jr: Living in the Environment. Principles, Connections and Solutions. Thomson, Brooks/Cole, 2005 (or more recent edition).
Further information: Organization responsible: Dept. of Biology, Environmental Sciences

EKOL2311 Geographical plant ecology 6 ECTS
Subject: Ecology
Person(s) in charge: Professor Lauri Oksanen, lauri.oksanen@utu.fi

Objectives: to understand factors structuring plant communities by using natural vegetation patterns as equivalents of long-term experiments.
Content: Lectures deal with macroclimate and other abiotic factors, competition between plants, herbivore-plant interactions and physical disturbances that modify plant communities, inf ncing the characteristics of "winners" and species diversity. In this context, we will tackle population and metapopulation dynamics and source sink dynamics, and learn the basics of the theoretical tools needed relevant for tackling these processes (e.g. game theory).
Languages of instruction: English
Teaching methods: Lectures.
Further information on teaching methods: lectures (6 hrs/week)
Modes of study: Participation in classroom work + written exam.
Further information on modes of study: Active participation to lectures and successful completion of the exam. Written final exam or course essay, where the student applies the contents of the course to some specific problem related to large scale vegetation patterns.
Evaluation: 1-5
Recommended year of study: 4. year autumn, 5. year autumn.
Further information on recommended year of study: The course is given in the fall of even years
Offering information: for JOO students
Further information: EKOL2311 Geographical plant ecology 6 ECTS was earlier in two parts: EKOL2311 Geographical plant ecology I: [Vegetation processes in arctic, alpine and arid environments] and EKOL2315 Geographical plant ecology II [Vegetation processes in forested biomes].

MAAN7802 Geography guest seminar 2 ECTS
Subject: Geography
Languages of instruction: Finnish, English
Modes of study: In Finnish: Other.
Evaluation: Pass/fail
Offering information: for JOO students

MAAN7663 GIS and society 4 ECTS
Subject: Geography
Person(s) in charge: Risto Kalliola
Objectives: Students will get an overview of the broad variety of applications and processes linked to spatial data, digital maps and navigation services. Applications of these are fast augmenting in society and pose challenges to geographical work from school teaching to scientific research. After finishing this course, students should feel their understanding about the societal relevance of GIS is broadened.
Content: Emphasis is given to for example such topics as societal needs of Earth monitoring and geographic information, spatial data infrastructure, spatial data services and consumer products as well as requirements of school teaching. The precise contents of this course may vary from year to year, reflecting the concurrent state of the art.
Languages of instruction: English
Further information on teaching methods: Lectures, exercises.
Planned times for teaching: Period I
Modes of study: Participation in classroom work + exercise(s).
Further information on modes of study: Compulsory participation in classroom work, timely completion of study assignments.
Evaluation: 1-5
Further information on recommended year of study: FM 1 or FM 2.
Offering information: for JOO students

GMAA4814 Glacial stratigraphy 5 ECTS
Subject: Quaternary Geology
Person(s) in charge: Professor Matti Räsänen, matti.rasanen@utu.fi
Objectives: The aim is to teach the students to critically use primary research literature.

Content: Reading of the primary literature, preparation of the PowerPoint presentation and presentation of it, visits in the field and field observations, addition of new data to the presentation, presentation of the final conclusions in a concluding seminar.
Further information on teaching methods: Reading of the primary literature, preparation of the PowerPoint presentation and presentation of it, visits in the field and field observations, addition of new data to the presentation, presentation of the final conclusions in a concluding seminar.
Modes of study: Written exam.
Further information on modes of study: Literature: The used research literature will be decided each time separately.
Evaluation: 1-5
Recommended year of study: 4. year spring.
Offering information: for JOO students

YMPS6046 Introduction to Environmental Sciences at the University of Turku 2 ECTS
Subject: Environmental Science
Person(s) in charge: Professor Timo Vuorisalo, timovuo@utu.fi
Objectives: This course aims to give students an overview of the entire range of environmental research within the University.
Content: Different research groups will give presentations of their research topics, methods and results.
Languages of instruction: English
Teaching methods: Lectures, Independent work.
Further information on teaching methods: Lectures and independent work
Modes of study: Study journal / learning diary OR Essay.
Evaluation: 1-5
Offering information: for JOO students
Further information: Organization responsible: Dept. of Biology, Environmental Sciences

YMPS5009 Introduction to futures studies 5 ECTS
Subject: Environmental Science
Person(s) in charge: Sirkka Heinonen
Objectives: This course offers the basic knowledge of futures studies. The students will learn the concepts most regularly used in futures studies and become familiar with the main theories and methods of the field.
Content: Foundations of futures studies human science for a new era, Bell, Wendell (1998), 1-56000-281-6
Languages of instruction: English
Teaching methods: Lectures.
Modes of study: Exercise(s) + written exam.
Further information on modes of study: o complete the course the students have to a) actively participate in exercises at the lectures, b) do all the self study assignments, and c) pass a literature exam.
Evaluation: 1-5
Recommended year of study: 1. year autumn.
Further information on prerequisites and recommendations: The students of the MDP in Environmental Sciences sign up for the course by sending an e-mail to futu@tse.fi and no JOO-application is needed.
Offering information: for JOO students
Further information: Organization responsible: Finlands Futures Research Centre. This is an optional common studies course.

MAAN6001 Introduction to geoinformatics 4 ECTS
Subject: Geography
Homepage URL: http://www.sci.utu.fi/maankurssit/MAAN6001
Person(s) in charge: Niina Käyhkö

Objectives: The aim of the course is that the students understand the basic concepts and methods of cartography and geoinformatics in geographical applications and in the society at large. These include remote sensing, map projections, coordinate systems, positioning technologies, databases, Geographical Information Systems (GIS) and cartographic communication. The student knows where geographical data can be obtained, is able to evaluate the quality and content of the data sets and knows how to use them, including interpretation, storage, queries, analyses and presentation of geographical information cartographically and numerically.
Content: - geographical information and data sets
- history and development of cartography
- map projections and coordinate systems
- remote sensing
- databases and statistical data
- Geographical Information Systems (GIS)
- positioning technologies and applications
- geographical analyses and interpretation
- cartographic communication and visualization
- Internet map services

Languages of instruction: English
Further information on teaching methods: Demonstrations and practical with 80% participation required, self-studying, portfolio, written exam
Languages of instruction: English
Further information on teaching methods: Demonstrations and practical with 80% participation required, self-studying, portfolio, written exam
Modes of study: Exercise(s) + participation in classroom work + portfolio + written exam.
Evaluation: 1-5
Evaluation criteria: written exam 70 % and portfolio map sheet 30 %
Recommended year of study: 1. year autumn.
Further information on prerequisites and recommendations: Sufficient skills in computing (excel, word, university network, internet browsing, image processing) are required.
Offering information: for JOO students
Study materials
demonstration notes and readings, practical material, virtual material (internet)
Further information: Organization responsible: Department of Geography

GMAA4736 Laboratory practical works in glacial and Quaternary geology 8 ECTS
Subject: Quaternary Geology
Person(s) in charge: Univ.teacher Eila Varjo, eila.varjo@utu.fi
Objectives: Student will learn to independently make different analysis and interpretation of central paleoecological materials. After the course the student has basic knowledge of pollen-, diatom- and macrofossil taxa and is capable of making preparaths from raw material.
Content: The course includes lectures and practicals of taxonomy and identification of macrofossils, diatoms and pollens; coring lake sediment, making diatom- and pollen-preparaths, identification and plotting the results into C2-program. Literature: selected parts from: Tracking environmental change using lake sediments. Vol I–IV Kluver Academic publishers.
Further information on teaching methods: Lectures + practicals 30–35 h, coring + laboratory work 10–15 h, self-study (identification) depending on the efficiency of student.
Modes of study: Participation in classroom work + exercise(s) + written exam.
Further information on modes of study: Attending to lectures, practicals, coring, laboratory work and succesful completion of exam.
Evaluation: 1-5
Further information on recommended year of study: I-II(III) periods
Further information on previous studies: GEOL4614 Practicals of Geochemistry
Offering information: for JOO students

MAAN7351 Landscape ecology and GIS 5 ECTS
Subject: Geography
Person(s) in charge: Niina Käyhkö
Objectives: The aim of the course is that students obtain skills in image processing, image interpretation and GIS techniques in the analysis of landscape and vegetation patterns and changes. Student will be able to interpret land cover and vegetation patterns from aerial photographs and satellite images and analyse landscape patterns and dynamics using GIS and field data. Students will also gain knowledge and tools for argumentation of the va s and applicability of landscape information in the society, especially for land use planning and landscape conservation.
Content: The course covers the following topics: theories of landscape research and landscape ecology applied in geography, landscape models and analysis approaches, field work techniques in landscape research, remote sensing, old maps and historical records as source materials in landscape studies and GIS methods in the analysis of landscape patterns and changes. The course includes lectures, demonstrations, self-study literature, virtual learning and field exercises either in Finland or in Sweden.
Languages of instruction: English
Further information on teaching methods: Lectures, group work discussion, field excursions, independent work, web assisted work.
Modes of study: Participation in classroom work + project / practical work + essay.
Further information on modes of study: Participation in classroom work, practical, excursions, individual work, written essay.
Evaluation: 1-5
Evaluation criteria: Written essay.
Further information on recommended year of study: Recommended year of study: FM 1. or 2. year spring (geography major).
Time: 4. period (intensive period in May)
Previous studies: Recommended previous studies
MAAN6451 Paikkatietomenetelmät, MAAN6452 Kaukokartoitusmenetelmät.
Further information on previous studies: Prerequisites: Methodological studies (both MAAN6451 and 6452) completed and basic knowledge of landscape ecology and biogeography.
Offering information: for JOO students
Study materials
Lecture and demonstrations notes with distributed self-study literature, practical material (instructions) and virtual resources via the Internet.
Further information: The course is organised every second year; not offered in 2011-2012 (next time in 2012-2013).

EKOL3012 Master's Thesis 40 ECTS
Subject: Ecology
Person(s) in charge: Professor Timo Vuorisalo, timovuo@utu.fi
Objectives: To demonstrate that the student masters the methods and literature related to the topic of the thesis and is capable of scientific thinking and communication.
Content: To go deeply into the subject of the thesis through practice and literature.
Teaching methods: Independent work.
Further information on teaching methods: The thesis must be done according to a plan made together with and accepted by the supervisor(s).
Modes of study: In Finnish: Thesis / dissertation.
Further information on modes of study: Thesis and maturity essay (kypsyysnäyte in Finnish)
Evaluation: Approbatur/laudatur
Further information on recommended year of study: The thesis is usually done during the second year of master's studies, but the timing should be programmed together with the potential supervisor(s) and the academic supervisor who helps in making the personal study plan of the student.
Offering information: for JOO students
Further information: Organization Responsible: Department of Biology, Section of Ecology

ESCE0010 Master's Thesis in Ecotoxicology 40 ECTS
Subject: Environmental Sciences
Person(s) in charge: Professor Mikko Nikinmaa, miknik@utu.fi
Objectives: To introduce the students in practical research and academic writing.
Content: The student carries out practical research and writes the thesis on a topic agreed with the supervisor. Before the thesis can be evaluated, the student must also write a maturity essay on one topic of the thesis. The maturity essay is evaluated on pass/fail scale.
Languages of instruction: English
Further information on teaching methods: Practicals and written work
Modes of study: Thesis / dissertation.
Further information on modes of study: Successful completion of the thesis.
Evaluation: Approbatur/laudatur
Recommended year of study: 2. year autumn, 2. year spring.
Offering information: for JOO students
Further information: Dept. of Biology, Section of Genetics and Physiology

MAAN6451 Methods in Geographical Information Systems (GIS) (v) 7 ECTS
Subject: Geography
Person(s) in charge: Niina Käyhkö
Objectives: To obtain advanced theoretical and applied knowledge on different geographical analysis techniques in GIS, including how to describe, evaluate, manage, analyse and visualise geographical information with raster and vector models. Student will obtain skills in using different types of geographical data sets and analyses techniques available in the GIS software ArcGIS.
Content: The course covers the following topics: revising principles for geographical phenomena and analyses, databases and geographical data models, geographical and attribute data management, data quality and interoperability, spatial interpolation principles and applications, neighbourhood analyses techniques, overlay analyses methods, spatial modelling, network analyses and visualisation.
Languages of instruction: English
Further information on teaching methods: Demonstrations and practical with 80% participation required + independent work.
Planned times for teaching: Period II
Modes of study: Project / practical work + portfolio + participation in classroom work + written exam.
Further information on modes of study: Participation to demonstrations and practical work + portfolio + written exam.
Evaluation: 1-5
Evaluation criteria: Written exam 100% of the mark + portfolio pass/fail.
Further information on recommended year of study: 3. year autumn, LuK 3 (geography major).
Previous studies: Recommended previous studies
MAAN6081 Kartografian ja geoinformatiikan perusteet (p).
Further information on previous studies: Prerequisites: MAAN6081 or equivalent study records.
Offering information: for JOO students
Study materials
Demonstrations notes, distributed literature, practical material (instructions and portfolio) and virtual resources via the Internet.
Further information: Sign-up during the teaching period 1 in NettiOpsu. Approximately 20-24 students will be accepted on the course based on their major subject and previous study records.

ESCE0005 Methods in Molecular and Genotoxicology 4 ECTS
Subject: Environmental Sciences
Person(s) in charge: Professor Mikko Nikinmaa, miknik@utu.fi
Objectives: The aim of the laboratory course is to introduce the methods commonly in use in measuring molecular and genetic disturbances caused by environmental toxicants.

Content: The methods presented vary according to the expertise of course instructors, but include methods to assess changes in gene expression and oxidative stress, cell viability assays, micronucleus tests and methods in ecotoxicogenomics.
Languages of instruction: English
Teaching methods: Lectures, Independent work, Exercises.
Further information on teaching methods: Lectures, experimental work, writing of lab notes.
Planned times for teaching: Period III
Modes of study: Participation in classroom work.
Further information on modes of study: Active participation in lab work, successful completion of the course report.
Evaluation: Pass/fail
Recommended year of study: 1. year spring.
Offering information: for JOO students
Further information: Dept. of Biology, Section of Genetics and Physiology

MAAN6452 Methods in remote sensing and image processing (v) 7 ECTS
Subject: Geography
Person(s) in charge: Niina Käyhkö
Objectives: To obtain basic theoretical and applied knowledge of different remote sensing systems (airborne and spaceborne), data pre-processing methods, visual image interpretation techniques and numerical image processing methods. Students know remote sensing terminology and are able to use remotely sensed images for geographical analysis of earth surface features.
Content: The course covers the following topics: introduction to remote sensing with key concepts, topics and relevance in geography, electromagnetic radiation and reflectance from the earth surfaces, introduction to aerial photography and photogrammetry, visual interpretation of aerial photographs, multiscpectral remote sensing and remote sensing satellite systems, image pre-processing methods, visual image interpretation and radiometric image enhancement techniques, spectral and spatial image processing methods and multispectral image classification techniques.
Languages of instruction: English
Further information on teaching methods: Demonstrations and practical with 80% participation required + independent work.
Planned times for teaching: Period IV
Modes of study: Project / practical work + portfolio + participation in classroom work + written exam.
Further information on modes of study: Participation to demonstrations and practical work + portfolio + written exam.
Evaluation: 1-5
Evaluation criteria: Written exam 100% of the mark + portfolio pass/fail.
Further information on recommended year of study: 2. year spring, LuK 2 (geography major).
Previous studies: Recommended previous studies
MAAN6081 Kartografian ja geoinformatiikan perusteet (p).
Further information on previous studies: Prerequisites: MAAN6081 or equivalent study records.
Offering information: for JOO students
Study materials
Demonstrations notes, distributed literature, practical material (instructions and portfolio) and virtual resources via the Internet.
Further information: Sign-up during the teaching period 3 in NettiOpsu. Approximately 20-24 students will be accepted on the course based on their major subject and previous study records.

ESCE0006 Modelling and Evaluating Toxicological Data Sets 4 ECTS
Subject: Environmental Sciences
Person(s) in charge: Professor Mikko Nikinmaa, miknik@utu.fi
Objectives: The aim of the course is to introduce methods and endpoints commonly used in modelling the effects of environmental toxicants and to introduce methods used in evaluating toxicological data based on material/data given in the beginning of the course.

Content: The students evaluate and use earlier gathered data sets to practically analyze the different endpoints and their utility in toxicological research and regulatory ecotoxicology
Languages of instruction: English
Teaching methods: Exercises.
Further information on teaching methods: Through practical (mainly computer) work acquaint the students on how to use data obtained in toxicological research. The students participating in this course can choose the timetable (during the spring term) fitting each individual (work is carried out in pairs)
Modes of study: Exercise(s).
Further information on modes of study: Successful completion of given tasks (practical calculations/modeling).
Evaluation: Pass/fail
Recommended year of study: 1. year spring.
Offering information: for JOO students
Further information: Dept. of Biology, Section of Genetics and Physiology

MAAN7091 MSc Thesis in Geography 40 ECTS
Subject: Geography
Person(s) in charge: Professors of Physical geography
Objectives: To introduce the students in practical research and academic writing.
Content: The student carries out practical research and writes the thesis on a topic agreed with the supervisor. Before the thesis can be accepted, the student must also write a maturity essay on one topic of the thesis. The maturity essay is evaluated on pass/fail scale.
Further information on teaching methods: Independent scientific research under guidance by the supervisor
Modes of study: In Finnish: Thesis / dissertation.
Further information on modes of study: Successful completion of the thesis.
Evaluation: Approbatur/laudatur
Study rights limitations
Available only for
major subject students
Further information: Organization responsible: Department of Geography

GMAA4806 Physical and chemical methods of lacustrine and marine sediments 5 ECTS
Subject: Quaternary Geology
Person(s) in charge: Professor Timo Saarinen, tijusa@utu.fi
Objectives: The object of this course is to provide state-of-art summary of the major field methods, chronological techniques, and concepts used in the study of large-scale lacustrine and marine basin analysis.
Content: Coring and dating techniques, sediment logging, mineral magnetic methods, image-analysis and other physical and chemical methods used to track environmental change using lake and marine sediments.
Further information on teaching methods: Lectures 16 h, one day lake coring trip and a simple practical work. The course will be given in Finnish 2011.
Modes of study: Written exam + participation in classroom work.
Evaluation: 1-5
Further information on previous studies: Quaternary geology or equivalent
Offering information: for JOO students
Study materials
Literature: Last and Smol, 2002. Tracking environmental change using lake sediments, vol 1&2 and some selected texts.

GMAA4730 Practical image analysis in Quaternary paleolimnology 2 ECTS
Subject: Quaternary Geology
Person(s) in charge: Professor Timo Saarinen, tijusa@utu.fi

Objectives: The aim of the course is learn basic of what kind of qualitative information is possible to obtain images using computer programs. The working environment is WorkMates in this course.
Content: The student makes 5-7 practical image analysis and image processing excersices using some freeware image analysis programs such as ImageJ.
Further information on teaching methods: 2h demonstration lecture (obligatory) and idividual work: 5-7 practical computer task with 2-3 pages long reports of each task
Modes of study: Exercise(s).
Further information on modes of study: Succesful completion of individual work
Evaluation: 1-5
Offering information: for JOO students

MAAN7891 Practical training 2–6 ECTS
Subject: Geography
Modes of study: In Finnish: Internship.
Evaluation: Pass/fail
Study rights limitations
Available only for
major subject students

ESCE0013 Practicals in Ecotoxicology 5–15 ECTS
Subject: Environmental Sciences
Person(s) in charge: Professor Mikko Nikinmaa, miknik@utu.fi
Objectives: To familiarize the students with the basic techniques and experimental design in the field of ecotoxicology.
Content: Practical work in the field of ecotoxicology. Possibilities include project work within the department or courses offered by other departments/universities. Before taking the course, its suit-ability to study plan must be agreed with the professor in charge.
Modes of study: Project / practical work OR Exercise(s).
Evaluation: Pass/fail
Evaluation criteria: Evaluation for a project is usually pass/fail but courses can also be evaluated on numerical scale 1-5.
Recommended year of study: 1. year spring, 2. year autumn.
Offering information: for JOO students
Further information: Dept. of Biology, Section of Genetics and Physiology

ESCE0008 Principles of Ecotoxicology 2 ECTS
Subject: Environmental Sciences
Person(s) in charge: Professor Mikko Nikinmaa, miknik@utu.fi
Objectives: To introduce students to the field of ecotoxicology.
Content: Topics covered include the uptake, biotransformation and excretion of chemicals in or-ganisms, the principal effects of environmental contamination on living systems and the appli-cation of biomarkers in environmental toxicology.
Teaching methods: Lectures 20 h.
Further information on teaching methods: Lectures and examination (instead of lectures the book Introduction to Ecotoxicology by D. Connell et al., 170 pp, 1999 can be used)
Planned times for teaching: Period I
Modes of study: Participation in classroom work + written exam. In Finnish: Written exam.
Further information on modes of study: Englanninkielisten ntojen tilalla voi tenttiä suomenkielis-tä
kirjallisuutta seuraavasti (2 op):
Pellinen, J., Sorvari, J., & Soimasuo, M. 2007: Pilaantuneen maaperän ekologinen riskinarviointi. Ympäristöopas (Y0). Suomen
ympäristökeskus. 114 s.
Ruoppa, M. & Heinonen, P. (toim.) 2004: Suomessa käytetyt biologiset vesitutkimusmenetelmät. Suomen ympäristö 682. 119 s.
Molemmat julkaisut löytyvät sähköisessä muodossa SYKEn kotisivuilta (www.ymparisto.fi).

Evaluation: 1-5
Offering information: for JOO students
Further information: Dept. of Biology, Section of Genetics and Physiology

GMAA4732 Quaternary environmental changes 2 ECTS
Subject: Quaternary Geology
Person(s) in charge: Professor Timo Saarinen, tijusa@utu.fi, FM Saija Turunen
Objectives: The aim of the course is to give the student a historical view why, how much and how the climate and the various global ecosystems have been changing during the Quaternary time.
Content: The course covers global aspects of environmental change over the last 2.6 million years. Lectures include the discovery of Glacial/integlacial cycles as recorded in geological archives (marine sediments and ice-cores), the methods used to identify these cycles and date them, and their impact on major vegetation belts. Global ecosystem processes are emphasised, so that students will appreciate the numerous feedback processes that can amplify or dampen climate forcing. Particular attention is placed on ocean circulation and its effect on the carbon cycle. One goal is to place the observed global warming of the last century into a "geoscience perspective".
Teaching methods: Lectures 12 h.
Modes of study: In Finnish: Written exam + participation in classroom work.
Evaluation: 1-5
Further information on recommended year of study: Not every year
Offering information: for JOO students
Further information: Not every year

GMAA4805 Quaternary Geology 6 ECTS
Subject: Quaternary Geology
Person(s) in charge: Professor Timo Saarinen, tijusa@utu.fi
Objectives: The students will get a thorough understanding of the different Quaternary environmental and climatic changes as well the research methodology applied to track these changes.
Content: Advanced level knowledge about ice age environmental changes, paleoclimatology and methods of reconstruction of Quaternary environment. The Quaternary Period comprises the last 2.5 million years of Earth history, an interval dominated by climate fluctuations and the waxing and waning of large northern hemisphere ice sheets. This course will cover the many types of geologic evidence, from polar ice sheets to deep-sea sediments that are used to reconstruct ocean and atmospheric conditions (e.g., temperature) through the Quaternary.
Languages of instruction: English
Teaching methods: Independent work.
Further information on teaching methods: Literature: selected up-to-date publications and selected part from text books: Ehlers, 1996. Quaternary and Glacial Geology; Lowe & Walker, 1997. Reconstructing Quaternary Environment; Siegert, M.J. Ice sheets and late Quaternary environmental change. John Wiley and Sons Ltd. (2001).
Modes of study: Written exam + participation in classroom work.
Further information on modes of study: Independent reading of given material.
Evaluation: 1-5
Evaluation criteria: Written exam.
Recommended year of study: 4. year autumn.
Offering information: for JOO students
Further information: Organization responsible: Dept. of Geology

MAAN7655 Readings in applied geoinformatics 5 ECTS
Subject: Geography
Person(s) in charge: Senior assistant Niina Käyhkö, niina.kayhko@utu.fi
Objectives: The aim of the course is that students specialise in particular fields of geoinformatics in geographical research or application and obtain skills in the theoretical, methodological and applied aspects of the field.
Content: According to the specialization as agreed with the examiner
Modes of study: Written exam. In Finnish: Written exam.

Evaluation: 1-5
Further information on recommended year of study: Exam dates year around according to the schedule
Previous studies: Recommended previous studies
MAAN6451 Paikkatietomenetelmät, MAAN6452 Kaukokartoitusmenetelmät.
Further information on previous studies: Methodological studies in geoinformatics (e.g. MAAN6451, 6452)
Offering information: for JOO students
Further information: Organization responsible: Department of Geography

ESCE0002 Readings in Ecology 6 ECTS
Subject: Environmental Sciences
Person(s) in charge: Professor Mikko Nikinmaa, miknik@utu.fi
Objectives: To ensure that the students have basic knowledge on ecological processes affected by the environment.
Content: Topics covered include the ecology of individuals, populations and communities. Examination of Begon et al. Ecology, 4rd edition, 2005 (ISBN 1405111178)
Languages of instruction: English
Further information on teaching methods: Independent studying for a book examination.
Modes of study: Written exam.
Evaluation: 1-5
Recommended year of study: 2. year autumn.
Offering information: for JOO students
Further information: Dept. of Biology, Section of Genetics and Physiology

ESCE0011 Readings in Environmental Chemistry 6 ECTS
Subject: Environmental Sciences
Person(s) in charge: Professor Mikko Nikinmaa, miknik@utu.fi
Objectives: To ensure that the students have basic knowledge on chemical processes affected by and affecting the environment.
Content: Depending on the background of the student, the ecology and environmental physiology exams may be substituted by the book Fundamentals of Environmental Chemistry (3rd edition), Stanley Manahan
Languages of instruction: English
Teaching methods: Independent work.
Further information on teaching methods: Independent studying for a book examination.
Modes of study: Written exam.
Further information on modes of study: Successful completion of a written exam.
Evaluation: 1-5
Recommended year of study: 2. year autumn.
Offering information: for JOO students
Further information: Dept. of Biology, Section of Genetics and Physiology

ESCE0001 Readings in Environmental Physiology of Animals 6 ECTS
Subject: Environmental Sciences
Person(s) in charge: Professor Mikko Nikinmaa, miknik@utu.fi
Objectives: To ensure that the students have basic knowledge on physiological processes affected by the environment.
Content: Topics covered include mechanisms of animal function and how these can be affected by the environment. Examination of Willmer et al. Environmental Physiology of Animals, 2nd edition, 768 pp, 2004
Languages of instruction: English
Teaching methods: Independent work.
Further information on teaching methods: Independent studying for a book examination.
Modes of study: Written exam.
Evaluation: 1-5

Recommended year of study: 1. year spring.
Offering information: for JOO students
Further information: Dept. of Biology, Section of Genetics and Physiology

MAAN6453 Readings in geoinformatics 2 ECTS
Subject: Geography
Person(s) in charge: Senior assistant Niina Käyhkö, niina.kayhko@utu.fi
Objectives: The aim of the course is that students revise and deepen their theoretical and applied knowledge in remote sensing, Geographical Information Systems and cartography parallel with other BSc -level geography and geoinformatics studies. Students obtain skills in the geoinformatics terminology, key methods and selected applications in the society.
Content: - GIS functionality, spatial models, projections and coordinate systems
- digitising, editing and creating geographical information
- remote sensing
- data quality and sources of error in GIS
- vector-raster conversions, spatial data management and databases
- spatial interpolation
- GIS in decision support
- cartographic communication and visualization
- cartographic generalisation
Modes of study: Written exam. In Finnish: Written exam.
Evaluation: 1-5
Further information on recommended year of study: exam dates year around according to the schedule
Further information on previous studies: MAAN6081 or MAAN6053 (Introduction to geoinformatics) completed. The literature exam can be used to compensate parts of these two courses (MSc in Environmental Sciences students, major in geoinformatics)
Offering information: for JOO students
Further information: Organization responsible: Department of Geography

MAAN7355 Readings in regional environmental research 2–8 ECTS
Subject: Geography
Person(s) in charge: Jukka Käyhkö
Languages of instruction: Finnish, English
Modes of study: In Finnish: Written exam.
Evaluation: 1-5
Offering information: for JOO students

YMPS1039 Research seminar in Environmental Sciences 4 ECTS
Subject: Environmental Science
Person(s) in charge: Professor Pekka Niemelä, pekka.niemela@utu.fi
Objectives: The aim of the course is to guide in scientific writing and to practice oral presentations within a multidisciplinary group of students.
Content: During the first study year advice for scientific writing is given. To learn scientific discussion the students listen and comment on seminar presentations given by second year students. If possible, presentations should be based on the Masters thesis works of the students. Each presentation has an opponent.
Languages of instruction: English
Teaching methods: Seminar.
Modes of study: Seminar.
Further information on modes of study: Active participation in seminars, one seminar presentation
Evaluation: Pass/fail
Recommended year of study: 1. year spring, 2. year spring.
Further information on recommended year of study: The second year students give presentations for the first year students. During the first year also advice for the Master's thesis is given.

Offering information: for JOO students
Further information: Department of Biology, Section of Ecology

GEOL1112 Resources of the Earth 2 ECTS
Subject: Geology
Person(s) in charge: Prof. Krister Sundblad
Objectives: Students learn basic knowledge on the natural resources of the Earth
Content: This course gives fundamental knowledge on the wide spectrum of non-renewable mineral, energy and water resources that exist on the earth, including metaliferous mineral deposits, industrial minerals, building stones, gravel, sand, soil, water, coal, oil and gas. Resources and reserves as well as geographical and geological distribution will be defined and discussed together with consumption patterns and environmental aspects of resource exploitation.
Languages of instruction: English
Teaching methods: Lectures 15 h.
Further information on teaching methods: Theoretical examinations
Modes of study: Written exam + participation in classroom work.
Further information on modes of study: lectures and exam.
Evaluation: 1-5
Recommended year of study: 2. year autumn.
Offering information: for JOO students
For international students in other institutions of higher education in Turku
Study materials
Press, F. & Siever, R. (2006): Understanding Earth tai Marshak, S., (2005): Earth, Potrait of a Planet
Further information: Level: Intermediate

ESCE0003 Seminars in Toxicology 4 ECTS
Subject: Environmental Sciences
Person(s) in charge: Professor Mikko Nikinmaa, miknik@utu.fi
Objectives: To give the students a picture of current toxicological research.
Content: Students read and present recent ecotoxicological articles.
Languages of instruction: English
Teaching methods: Study Group.
Further information on teaching methods: Weekly journal club
Modes of study: Seminar.
Further information on modes of study: Active participation in the seminar. Every student presents an article once a week through one academic year.
Evaluation: Pass/fail
Recommended year of study: 1. year autumn, 1. year spring.
Offering information: for JOO students
Further information: Dept. of Biology, Section of Genetics and Physiology

YMPS5007 Sustainable futures: environment, culture, society, economy 3 ECTS
Subject: Environmental Science
Person(s) in charge: Piia Nurmi
Objectives: The students get acquainted with the concept of sustainability, especially with how this concept can be utilised in the development of the environment, culture, society, and economy in light of energy, climate, technological innovations, and population growth.
Content: To complete the course the students have to a) actively participate in exercises at the lectures, b) complete the weekly individual assignments c) pass the report
Languages of instruction: English
Teaching methods: Lectures, Independent work, Exercises.
Modes of study: Exercise(s) + study journal / learning diary.
Evaluation: 1-5
Recommended year of study: 1. year spring.

Further information on prerequisites and recommendations: The students of the MDP in Environmental Sciences sign up for the course by sending an e-mail to futu@tse.fi and no JOO-application is needed.
Offering information: for JOO students
Further information: Organization responsible: Finlands Futures Research Centre. The course is combined with the course YMPS5008 into a course called Global challenges and sustainable futures, 6 ECTS.

YMPS5008 Sustainable futures: The future of the globalizing world 3 ECTS
Subject: Environmental Science
Person(s) in charge: Hanna Kaisti
Objectives: The aim of the course is to give an overview of the challenges and opportunities faced by the developing countries in defining their future policies on natural resource use, energy choices and adaptation to climate change.
Content: The course focuses on the futures of the developing countries and the possibilities to increase equity, well-being and development without jeopardizing the environment. The course begins by a brief critical introduction on development thinking. It continues by introducing foresight methods that can be used in defining and selecting possible development paths. The development challenges and opportunities are analyzed through concrete examples from Africa and Asia. Course theme this year is sustainable futures in development.
Languages of instruction: English
Teaching methods: Lectures, Exercises.
Modes of study: Exercise(s) + written exam.
Further information on modes of study: To complete the course the students have to a) actively participate in exercises at the lectures (18h), b) pass the exam.
Evaluation: 1-5
Further information on prerequisites and recommendations: The students of the MDP in Environmental Sciences sign up for the course by sending an e-mail to futu@tse.fi and no JOO-application is needed.
Offering information: for JOO students
Further information: Organization responsible: Finlands Futures Research Centre. The course is combined with the course YMPS5007 into a course called Global challenges and sustainable futures, 6 ECTS.

GMAA4675 Thesis 40 ECTS
Subject: Quaternary Geology
Person(s) in charge: Professor Timo Saarinen, tijusa@utu.fi, Professor Matti Räsänen, matti.rasanen@utu.fi
Objectives: To introduce the students in practical research and academic writing.
Content: The student carries out practical field and laboratory research and writes the thesis on a topic agreed with the supervisor.
Further information on teaching methods: Supervision in the field and laboratory and written work
Modes of study: Thesis / dissertation.
Further information on modes of study: Successful completion of the thesis.
Evaluation: Approbatur/laudatur
Recommended year of study: 5. year autumn, 5. year spring, 6. year autumn, 6. year spring.
Offering information: for JOO students
Further information: Organization responsible: Dept. of Geology

EKOL3150 Tropical plant families 4 ECTS
Subject: Ecology
Person(s) in charge: Lecturer Hanna Tuomisto, hanna.tuomisto@utu.fi
Objectives: After the course the student knows the names of about 100 ecologically and economically important tropical plant families and is able to identify plants with typical characteristics to the correct family.
Content: During the lectures, the most important diagnostic characteristics of the families are explained and illustrated using photographs and both fresh and dried plant specimens. Plant identification is further practiced during an excursion to Ruissalo Botanical Garden. It is strongly recommended that students visit the Ruissalo Garden on their own for further practice.
Languages of instruction: English
Further information on teaching methods: Lectures, demonstrations, excursion to the Ruissalo Botanical Garden. Photographic material and internet links are provided to facilitate self-study.
Planned times for teaching: Period I
Modes of study: Written exam.
Further information on modes of study: Written exam based on identifying plant specimens to family.
Evaluation: 1-5
Recommended year of study: 4. year autumn, 4. year spring, 5. year autumn, 5. year spring.
Offering information: for JOO students
Further information: The course is only given in uneven years.

EKOL3134 Use of GIS and Remote Sensing in Studying Biodiversity 2 ECTS
Subject: Ecology
Person(s) in charge: Lecturer Hanna Tuomisto, hanna.tuomisto@utu.fi
Objectives: After the course the student will understand what kinds of ecological questions can be answered by the use of GIS and/or remote sensing, and will be familiar with examples of different practical applications of these techniques. The student will also be aware of common problems related to data quality and interpretation of the results and is able to use this knowledge to assess research reports critically.
Content: Student presentations and discussion of relevant research articles and the methods applied in them, guest lectures of researchers, a visit to the regional office of the national environmental administration in Turku.
Languages of instruction: English
Further information on teaching methods: Lectures and student presentations.
Planned times for teaching: Period IV
Modes of study: Participation in classroom work + oral presentation.
Further information on modes of study: Attendance in class, presentation of a research article, making critical comments on at least two other articles, participation in the visit to the regional office.
Evaluation: Pass/fail
Recommended year of study: 4. year spring, 5. year spring.
Further information on previous studies: Basic technical knowledge about GIS and remote sensing is assumed, e.g. the course Johdatus geoinformatiikkaan, MAAN0205
Offering information: for JOO students
Further information: The course is only given in even years.

EKOL3004 Visitor seminar 2 ECTS
Subject: Ecology
Person(s) in charge: yliassistentti Veijo Jormalainen, veijo.jormalainen@utu.fi
Objectives: The aim of this seminar series is to provide perspectives to current theories, questions and empirical data in ecological research as well as provide a discussion forum and international contacts between the section of Ecology and foreign universities and research institutes.
Content: Seminars on various topics in ecology and biodiversity research given by visiting scientists throughout the year, without a fixed schedule.
Languages of instruction: English

Teaching methods: Seminar.
Planned times for teaching: Periods I, II, III, IV
Modes of study: Seminar + study journal / learning diary.
Further information on modes of study: Participation in seminars, approved summaries (max. one A4 page) of 10 presentations.
Evaluation: Pass/fail
Recommended year of study: 3. year autumn, 3. year spring, 4. year autumn, 4. year spring, 5. year autumn, 5. year spring.
Offering information: for JOO students

EXAM DATES 2011—2012

Exam dates for the academic year and summer are published at http://www.sci.utu.fi/tdk/opiskelu/opiskelijalle/Syksyn_tentit_2011.pdf.

The examinations mostly last four hours, the starting time, time when you are allowed the leave at earliest (30 minutes after the start) and the ending time of the examination are written on the board in front of the lecture hall. Mobile phones should be turned silent and left in your bag on the corridor of the lecture hall. The questions for the examination are shared by calling names in front of the lecture hall. You can also pick up paper for answering there. In addition to the papers the student may bring only writing equipment and a personal ID card into his/her place (unless other equipment is agreed when signing up for the examination. The examination starts when permission to open the examination envelopes is given.
If you need to go to the toilet or ask something during the examination, raise your hand and wait for one of the supervisors to come to you. You are not allowed to talk to other students sitting in the examination. Once you are ready to leave you should bring the papers in front of the lecture hall, show your identity card if asked and silently pick you bag and leave. During the periods the results of an examination should show in the study register two weeks later. Therefore check your transcript regularly at nettiopsu.utu.fi.

CONTACT INFORMATION

Faculty administration
Natural science building II, ground floor

Head of student and academic affairs:
Tiina Mäkynen
Tel. (02) 333 5602
E-mail: tiina.makynen@utu.fi
Office hours: Mon 12–14

Coordinator of the student admissions of the international Master's Degree Programmes and the MDP in Environmental Sciences:
Hanna Tranberg
Tel. (02) 333 5662
E-mail: envsci@utu.fi or master-sci@utu.fi
Office hours: Whenever available from Mon–Fri at 12–14

Common Studies

Responsible teacher
Timo Vuorisalo
Department of Biology
Tel. (02) 333 5792
E-mail: timovuo@utu.fi
Office hours: Tue and Thu 13–14

Ecotoxicology

Responsible professor:
Mikko Nikinmaa
Department of Biology
Tel. (02) 333 5731
E-mail: mikko.nikinmaa@utu.fi
Office hours: Wed 12–13

Quaternary Paleoecology and Environmental History

Responsible professor:
Matti Räsänen
Department of Geography and Geology
Section of Geology
Tel. (02) 333 5494
E-mail: matti.rasanen@utu.fi
Office hours: Wed and Thu 15–16

Academic advisor:
Kari Yli-Kyyny
Department of Geography and Geology
Section on Geology
E-mail: ylikyyny@utu.fi

Spatial and Ecological Interactions

Responsible professor:
Pekka Niemelä
Department of Biology
E-mail: pekka.niemela@utu.fi

Academic advisor:
Kalle Ruokolainen
Department of Biology
Tel. (02) 333 6015
E-mail: kalle.ruokolainen@utu.fi

Academic advisor (geoinformatics):
Niina Käyhkö
Department of Geography and Geology
Section of Geography
Tel. (02) 333 6287
E-mail: niina.kayhko@utu.fi