

Opasraportti

FSci - Courses in English for exchange students (2018 - 2019)

Courses in English for exchange students at the Faculty of Science

This Course Catalogue lists courses taught in English that are available for exchange students at the Faculty of Science (Biology, Geography, Physics or Mathematics) during academic year 2018-19.

When preparing your study plan please use the information provided under the **Courses** tab in this catalogue. Read carefully the information of each course you wish to take (language of instruction, target group, course content, timing, preceding studies, additional information etc.).

For information on the exchange application process please see www oulu.fi/university/studentexchange. All exchange applicants must submit their exchange application through the SoleMOVE online system by the deadline given, proposed study plan must be attached to the online application.

Accepted exchange students are required to register to all courses. Course registration takes place once you have received your University of Oulu login information, this takes place close to the start of your exchange period. When registering you will be able to find detailed information on teaching and schedule under **Instruction** tab.

Teaching periods for 2018-19

Autumn term 2018

Period 1: Sept 3 - Oct 26, 2018

Period 2: Oct 29 – Dec 21, 2018

Spring term 2019

Period 3: Jan 7 – March 8, 2019

Period 4: March 11 – May 10, 2019

For arrival and orientation dates see www oulu.fi/university/studentexchange/academic-calender

Any questions on courses at the Faculty of Science should be addressed to:

Ms Essi Hakala or Ms Marita Puikkonen, [study.science\(at\)oulu.fi](mailto:study.science@oulu.fi)

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

www oulu.fi/university/studentexchange or [international.office\(at\)oulu.fi](mailto:international.office@oulu.fi)

Tutkintorakenteisiin kuulumattomat opintokokonaisuudet ja -jaksot

790607S: Advanced literature of Geography, 1 - 5 op

790325A: Applied literature of Geography, 1 - 5 op

755321A: Aquatic ecology field course, 5 op
 766665S: Atomic physics 2, 5 op
 764638S: Basic Neuroscience, 5 op
 764338A: Basic Neuroscience, 5 op
 802328A: Basics in Number Theory, 5 op
 756351A: Basics in population ecology, 5 op
 757313A: Basics in population genetics, 5 op
 757313A-02: Basics in population genetics, exercises, 0 op
 757313A-01: Basics in population genetics, lectures, 0 op
 757314A: Basics of bioinformatics, 5 op
 755608S: Bird ecology and conservation, 2 op
 765639S: Celestial mechanics II, 10 op
 764622S: Cell membrane biophysics, 10 op
 764322A: Cell membrane biophysics, 10 op
 802338A: Complex Analysis II, 5 op
 766663S: Computational physics and chemistry , 5 op
 802655S: Continued Fractions, 5 op
 801698S: Cryptography, 5 op
 802671S: Data assimilation, 5 op
 792301A: Economic Geography and its Applications, 5 op
 750349A: Examinations on optional topics in biology, 2 - 10 op
 791610S: Final examination, 5 op
 802647S: Fourier series and the discrete Fourier transform, 10 op
 802650S: Fractal Geometry, 10 op
 755324A: Functional animal ecology, 5 op
 790101P: GIS-basics and Cartography, 5 op
 790101P-01: GIS-basics and Cartography, exercises, 0 op
 790101P-02: GIS-basics and Cartography, lectures, 0 op
 765309A: Galaxies, 5 op
 790340A: Geographies of global development, 5 op
 766656S: Heliospheric physics, 8 op
 756355A: Identification of plant species, brief, 3 op
 Compulsory
 756355A-01: Identification of plant species, monocotyledons, brief, 0 op
 756355A-02: Identification of plant species, dicotyledons, brief, 0 op
 756354A-02: Identification of plant species, dicotyledons, extensive, 0 op
 756354A: Identification of plant species, extensive, 5 op
 756354A-01: Identification of plant species, monocotyledons, extensive, 0 op
 791633S: International lectures, 2 op
 802668S: Introduction to Functional Analysis, 5 op
 800149P: Introduction to LaTeX, 2 op
 756650S: Introduction to molecular ecology, 5 op
 756650S-02: Introduction to molecular ecology, exercises, 0 op
 756650S-01: Introduction to molecular ecology, lectures, 0 op
 790102P: Introduction to the systematic Physical Geography, 5 op
 802661S: Inverse problems, 5 op
 766675S: Laser and synchrotron radiation physics, 10 op
 802320A: Linear Algebra, 5 op
 752316A: Macro fungi, 3 op
 761657S: Magnetospheric physics, 8 op
 761118P: Mechanics 1, 5 op
 Compulsory
 761118P-01: Mechanics 1, lectures and exam, 0 op
 761118P-02: Mechanics 1, lab. exercises, 0 op
 791626S: Methodological special themes in Physical Geography, 5 op
 755325A: Methods in ecology I, 5 op
 755329A: Methods in ecology II, 5 op
 766667S: Modern characterization methods in material science, 5 op
 801631S: Modern real analysis, 5 op
 757311A: Molecular methods I, 5 op
 761620S: Molecular properties, 5 op
 766666S: NMR spectroscopy , 10 op
 767303S: Observational Astronomy I, 5 op
 767300A: Observational astronomy II, 5 op

767600S: Observational astronomy II, 5 op
 750399A: Optional examinations in environmental protection, 2 - 6 op
 791635A: Physical Geography of Fennoscandia, 5 op
 767302A: Physics of the solar system II, 5 op
 767602S: Physics of the solar system II, 5 op
 756344A: Plant ecology, 5 op
 756343A: Plant ecology field course, 5 op
 791621S: Political geography, 5 op
 791621S-02: Political geography, book, 0 op
 791621S-01: Political geography, lectures, 0 op
 791613S: Position based analyses and services in geography, 5 op
 791619S: Pro gradu thesis (Master Thesis), 30 op
 800683S: Project in mathematics, 10 op
 763312A: Quantum mechanics I, 10 op
 763612S: Quantum mechanics I, 10 op
 763613S: Quantum mechanics II, 10 op
 763313A: Quantum mechanics II, 10 op
 766657S: Radio waves in the ionosphere, 8 op
 790106A: Region, culture and society, 5 op
 792319A: Regional politics, policy and development: Northern Europe, 5 op
 791636S: Remote sensing in Physical Geography, 5 op
 765307A: Research Project of Astronomy I, 5 op
 765307A-01: Research Project of Astronomy I: Data processing in astronomy, 0 op
 765307A-02: Research Project of Astronomy I: Study project, 0 op
 750613S: Research training, 2 - 15 op
 755632S: Restoration ecology, 5 op
 791631S: Seminar in master's thesis, 5 op
 766654S: Solar physics, 8 op
 750654S: Special lecture in biology, 2 - 5 op
 790605S: Special research course in Physical Geography, 5 op
 765626S: Stellar structure and evolution, 10 op
 790346A: Substituting written exam (Phy.g), 5 op
 790610S: Sustainable tourism development in Northern environments, 10 op
 802642S: Symmetry groups, 5 op
 790620S: Tourism planning and development, 5 op
 790320A: Tourism planning and development, 5 op
 790320A-01: Tourism planning and development, book exam, 0 op
 790320A-03: Tourism planning and development, exercises, 0 op
 790320A-02: Tourism planning and development, lectures, 0 op
 790161A: Tourism, development and sustainability, 5 op
 790161A-02: Tourism, sustainability and environment, essay, 0 op
 790161A-01: Tourism, sustainability and environment, exam, 0 op
 791629S: Traditions and current issues in tourism research, 5 op
 761310A: Wave motion and optics, 5 op
 Compulsory
 761310A-01: Wave motion and optics, lectures and exam, 0 op
 761310A-02: Wave motion and optics, lab. exercises, 0 op
 755328A: Wildlife management and game animal ecology, 5 op
 750377A: Winter ecology and physiology, 5 op
 790349A: World regional geography, 5 op

Opintojaksojen kuvaukset

Tutkintorakenteisiin kuulumattomien opintokokonaisuuksien ja -jaksojen kuvaukset

790607S: Advanced literature of Geography, 1 - 5 op

Voimassaolo: 01.01.2017 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Geography

Arvostelu: 1 - 5, pass, fail

Opettajat: Jan Hjort, Paasi Anssi, Saarinen, Jarkko Juhani

Opintokohteen kielet: Finnish

ECTS Credits:

1-5 ECTS

Language of instruction:

Finnish or English.

Timing:

1st or 2nd MSc-year, 1st or 2nd semester.

Learning outcomes:

The student will deepen his/her knowledge through literature. More exact learning outcomes is based on method of implementation of the course (agreed with professor).

Contents:

This course serves the specialization of the student. After the course, the student has deepened his/her knowledge and experience in geography.

Mode of delivery:

Book exam, essay or independent studying.

Learning activities and teaching methods:

Ways of performance is discussed with professor.

Target group:

MSc-students

Recommended or required reading:

Will be agreed with professor.

Assessment methods and criteria:

Will be agreed with professor. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass/fail

Person responsible:

Toni Ahlqvist, Jan Hjort, Anssi Paasi, Jarmo Rusanen, Jarkko Saarinen

790325A: Applied literature of Geography, 1 - 5 op

Voimassaolo: 01.01.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Geography

Arvostelu: 1 - 5, pass, fail

Opettajat: Juha Ridanpää, Janne Alahuhta, Eeva-Kaisa Prokkola, Heikki Sirviö

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

1-5 ECTS

Language of instruction:

Finnish or English

Timing:

1st or 2nd year, 1st or 2nd semester.

Learning outcomes:

The student will deepen his/her knowledge through literature. More exact learning outcomes is based on method of implementation of the course.

Contents:

This course serves the specialization of the student. After the course, the student has deepened his/her knowledge and experience in geography.

Mode of delivery:

Book exam, essay or other mode of independent studying.

Learning activities and teaching methods:

Ways of performance is discussed with the person responsible of the course.

Target group:

Bachelor students of geography

Prerequisites and co-requisites:

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Recommended optional programme components:

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Recommended or required reading:

Will be agreed with teacher.

Assessment methods and criteria:

Will be agreed with teacher. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass/fail

Person responsible:

Janne Alahuhta, Juha Ridanpää and Heikki Sirviö

755321A: Aquatic ecology field course, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Muotka, Timo Tapani, Kaisa-Leena Huttunen

Opintokohteen kielet: Finnish

Leikkaavuudet:

751307A Field course in aquatic animals 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

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

Learning outcomes:

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

Contents:

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

Mode of delivery:

Face-to-face teaching and independent studying.

Learning activities and teaching methods:

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

Target group:

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

Prerequisites and co-requisites:

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

Recommended optional programme components:

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

Recommended or required reading:

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

Assessment methods and criteria:

On the final course day species identification exam on the species met during the course, practical exam on the sampling methods and

theoretical exam based on the literature and demonstration material.

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

Grading:

1-5 / Fail.

Person responsible:

Prof. Timo Muotka.

Working life cooperation:

No.

Other information:

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76665S: Atomic physics 2, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish, English

ECTS Credits:

5 ECTS

Language of instruction:

English

Timing:

Not lectured every year.

Learning outcomes:

After the course the student is able to explain the fundamentals of the numerical research in atoms, especially the Hartree-Fock type methods, and can interpret the basic features of the atomic spectra with the physical principles presented. The student will know the principal features of the existing codes in order to perform simple numerical analysis on the structure of atoms.

Contents:

The goal is to form deep understanding of the structure of many-electron atoms and their electron-electron interactions and electron dynamics. The quantum mechanical formalisms are applied to the description of quantum states and transitions in a many-electron atoms. The students will be introduced to codes used in practical simulations. Model computations will be performed whose results will be compared to the experimental ones. This will familiarize the student to the steps in actual research: the models of atomic structure are refined using the experimental and computational methods simultaneously.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 26 h, exercises 20 h, self-study 134 h

Target group:

Primarily for the students of the degree programme in physics. Also for the other students of the University of Oulu.

Prerequisites and co-requisites:

766326A Atomic physics 1 and 763312A Quantum mechanics I

Recommended optional programme components:

No alternative course units or course units that should be completed simultaneously

Recommended or required reading:

Lecture notes, B.H. Bransden, C.J. Joachain: Physics of atoms and molecules

Course material availability can be checked here.

Assessment methods and criteria:

One oral (if agreed) examination.

Read more about assessment criteria at the University of Oulu webpage.

Grading:

Numerical grading scale 0 – 5, where 0 = fail

Working life cooperation:

No work placement period

Other information:

Kurssin sivu : <https://noppa.oulu.fi/noppa/kurssi/761671s/esite>

764638S: Basic Neuroscience, 5 op

Voimassaolo: 01.01.2009 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

764338A Basic Neuroscience 5.0 op

ECTS Credits:

5 ECTS cr

Language of instruction:

Finnish (Exam can be done in English on the basis of the course book)

Timing:

3th - 5th spring (depending on whether included in BSc or MSc degree)

Learning outcomes:

Student will be able to explain basic organization and functions of the nervous system.

Contents:

General organization and function of the peripheral and central nervous system are introduced based on a course book. Objective of the course is to provide students with a broad view of the basic principles of nervous system function based on recent knowledge.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 28 h, self-study 105 h

Target group:

Primarily the students of the degree programme in physics, especially the biomedical physics students. Also the other students of the University of Oulu.

Prerequisites and co-requisites:

No specific prerequisites

Recommended optional programme components:

No alternative course units or course units that should be completed simultaneously

Recommended or required reading:

Lectures and the course book Dale Purves et al.: Neuroscience, 4th edition or newer, Sinauer Associates Inc., MA, USA, 2008.

Assessment methods and criteria:

Final exam

Grading:

Numeerinen arviointiasteikko 0 – 5, missä 0 = hylätty

Person responsible:

Esa-Ville Immonen, Kyösti Heimonen

Working life cooperation:

Ei sisällä työharjoittelua

Other information:

[Course page](#)

764338A: Basic Neuroscience, 5 op

Voimassaolo: 01.01.2009 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

764638S Basic Neuroscience 5.0 op

ECTS Credits:

5 ECTS cr

Language of instruction:

Finnish (Exam can be done in English on the basis of the course book)

Timing:

3th - 5th spring (depending on whether included in BSc or MSc degree)

Learning outcomes:

Student will be able to explain basic organization and functions of the nervous system.

Contents:

General organization and function of the peripheral and central nervous system are introduced based on a course book. Objective of the course is to provide students with a broad view of the basic principles of nervous system function based on recent knowledge.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 28 h, self-study 105 h

Target group:

Primarily the students of the degree programme in physics, especially the biomedical physics students. Also the other students of the University of Oulu.

Prerequisites and co-requisites:

No specific prerequisites

Recommended optional programme components:

No alternative course units or course units that should be completed simultaneously

Recommended or required reading:

Lectures and the course book Dale Purves et al.: Neuroscience, 4th edition or newer, Sinauer Associates Inc., MA, USA, 2008.

Assessment methods and criteria:

Final exam

Grading:

Numerical grading scale 0 – 5, where 0 = fail

Person responsible:

Esa-Ville Immonen, Kyösti Heimonen

Working life cooperation:

No work placement period

Other information:

[Course website](#)

802328A: Basics in Number Theory, 5 op

Voimassaolo: 01.06.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opettajat: Tapani Matala-aho

Opintokohteen oppimateriaali:

Hardy, G. H., , 1979

Rosen, Kenneth H., , 1993

Opintokohteen kielet: Finnish

ECTS Credits:

5 cr

Language of instruction:

Finnish/English

Timing:

2.-3. year of studies. Timing varies.

Learning outcomes:

As usual in my mathematical studies I shall be able to solve problems arising from the subject and to prove essential theorems starting from the given definitions using the tools applied in the course. More detailed; For example, when I pass the course with the grade 1/5, I shall recognize most definitions and I am able to solve closely related problems. Also I am able to rewrite short proofs with some understanding. When I pass the course with the grade 5/5, then I shall understand well the given definitions with the proofs of the theorems deduced from them. Further, I am able to solve challenging problems which demand independent deductions with several stages and applications of appropriate tools.

Contents:

In our lectures we consider arithmetical properties of the common numbers involved in studying mathematics and in particular number theory. Also the methods will get a special interest. Examples of the numbers under the research will be binomials, continued fractions, sums of powers and some numbers sharing a name with the mathematicians Bernoulli, Euler, Fermat, Fibonacci, Heron, Lucas, Mersenne, Neper, Pythagoras, Stirling, Wilson and Wolstenholme. From the tools we mention congruences of rational numbers and polynomials, difference operators, generating series, irrationality considerations, matrix presentations, recurrences and telescopes.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures and exercises

Target group:

Major and minor students

Prerequisites and co-requisites:

802354A Lukuteoria ja ryhmät

802355A Rings, fields and polynomials

802118P Linear algebra I

802119P Linear algebra II

802352A Euclidean topology

802353A Series and integrals

Recommended optional programme components:

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Recommended or required reading:

Lecture notes,

G.H. Hardy ja E.M. Wright: An Introduction to the Theory of Numbers;

Kenneth H. Rosen: Elementary number theory and its applications.

Assessment methods and criteria:

Mid-term exams or final exam

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

1-5

Person responsible:

Tapani Matala-aho

Working life cooperation:

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Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kvist, Laura Irmeli

Opintokohteen kielet: Finnish

Leikkaavuudet:

755336A Population ecology 10.0 op

756323A Population biology of plants 5.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 3rd autumn.

Learning outcomes:

Basic skills in methods of population biology.

Contents:

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

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

32 h lectures, 18 h computer exercises, seminar.

Target group:

ECO: compulsory.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

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Recommended or required reading:

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

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

Assessment methods and criteria:

Exam.

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

Grading:

1-5 / Fail.

Person responsible:

Doc. Laura Kvist

Working life cooperation:

No.

Other information:

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757313A: Basics in population genetics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Lumi Viljakainen

Opintokohteen kielet: Finnish

Leikkaavuudet:

753314A Basics in population genetics 8.0 op

ECTS Credits:

5 cr / 133 hours of work.

Language of instruction:

English.

Timing:

B.Sc. 2nd spring BSc, M.Sc. 1st spring, ECOGENgen 1st spring, genetics: compulsory in M.Sc. degree.

Learning outcomes:

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

Contents:

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

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

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

Target group:

B.Sc. 2nd spring BSc, M.Sc. 1st spring, ECOGENgen 1st spring, genetics: compulsory in M.Sc. degree.

Prerequisites and co-requisites:

Concepts of genetics (757109P) and Experimental course in general genetics (757110P) or equivalent knowledge and Molecular evolution (757312A).

Recommended optional programme components:

Compulsory prerequisite for courses Experimental course in evolutionary genomics (757621S), Advanced course in bioinformatics (757619S) and DNA analysis in population genetics (757618S). Recommended prerequisite for course Quantitative genetics (805338A).

Recommended or required reading:

Hamilton, M. B. 2009: Population genetics, Wiley-Blackwell.

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

Assessment methods and criteria:

Take-home exam, problem solving, laboratory and computer exercises, seminar.

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

Grading:

1-5 / Fail.

Person responsible:

Doc. Lumi Viljakainen.

Working life cooperation:

No.

Other information:

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

757313A-02: Basics in population genetics, exercises, 0 op

Voimassaolo: 01.08.2015 - 31.12.2019

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

757313A-01: Basics in population genetics, lectures, 0 op

Voimassaolo: 01.08.2015 - 31.12.2019

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kvist, Laura Irmeli, Lumi Viljakainen

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

757314A: Basics of bioinformatics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Lumi Viljakainen

Opintokohteen kielet: Finnish

Leikkaavuudet:

750340A Basics of bioinformatics 3.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. studies, 3rd autumn.

Learning outcomes:

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

Contents:

Searching DNA and protein sequences and information connected to the sequences from various databases, genome structure and sequence-based gene prediction and annotation, sequence alignment, introduction to next-generation sequencing techniques.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

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

Target group:

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

Prerequisites and co-requisites:

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

Recommended optional programme components:

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Recommended or required reading:

Pevsner, J. 2015: Bioinformatics and functional genomics, Wiley-Blackwell.

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

Assessment methods and criteria:

Take-home exam, exercises, seminar presentation, independent work and student activity.

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

Grading:

1-5 / Fail.

Person responsible:

Doc. Lumi Viljakainen.

Working life cooperation:

No.

Other information:

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755608S: Bird ecology and conservation, 2 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Koivula, Seppo Rytönen

Opintokohteen kielet: Finnish

ECTS Credits:

2 ECTS credits / 53 hours of work.

Language of instruction:

English

Timing:

M.Sc. degree. Every second year (arranged if resources allow).

Learning outcomes:

Student gets current scientific research knowledge in animal reproductive ecology and behaviour.

Contents:

Introduction to sexual reproduction and parental care in animals. Birds are used as a taxonomic reference group, but the concepts and theories are discussed in the general evolutionary ecological framework. Topics: e.g. habitat selection, territoriality, mating systems and brood parasitism.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

24 h lectures, exam.

Target group:

-

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Exam.

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

Grading:

1-5 / Fail.

Person responsible:

Doc. Seppo Rytönen and Doc. Kari Koivula.

Working life cooperation:

No.

Other information:

-

765639S: Celestial mechanics II, 10 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opettajat: Jürgen Schmidt

Opintokohteen kielet: English, Finnish

ECTS Credits:

10 ECTS cr

Language of instruction:

English

Timing:

Not lectured every year

Learning outcomes:

After completing the course the student can explain elements of perturbation theory, as they occur in problems of solar system dynamics, like tidal interactions, resonances, and spin orbit coupling.

Contents:

In extension of the course 'Celestial Mechanics' this course addresses special topics like the gravitational field of non-spherical bodies, perturbation theory, resonances and planetary rotation.

Mode of delivery:

Not lectured every year

Learning activities and teaching methods:

26 hours lecture, 26 hours exercises, 135 hours self-study

Target group:

Primarily for the students of the degree programme in physics. Also for the other students of the University of Oulu. The course can be taken at an intermediate and at an advanced level.

Recommended or required reading:

'Solar System Dynamics', C.D. Murray, S.F. Dermott (Cambridge University Press), 'Physics of the Solar System', B. Bertotti, P. Farinella, D. Vokrouhlicky (Kluwer Academic Publishers)

Assessment methods and criteria:

One written examination Read more about assessment criteria at the University of Oulu webpage.

Grading:

Numerical grading scale 0 – 5, where 0 = fail

Person responsible:

Juergen Schmidt

Other information:

<https://noppa.oulu.fi/noppa/kurssi/765606s/esite>

<https://noppa.oulu.fi/noppa/kurssi/765306a/etusivu>

764622S: Cell membrane biophysics, 10 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

764322A Cell membrane biophysics 10.0 op

ECTS Credits:

10 ECTS cr

Language of instruction:

English

Timing:

3rd-5th autumn (depending on whether included in BSc or MSc degree). Lectured every second year (during odd years).

Learning outcomes:

After finishing the course the student is able to describe the basics of cell membrane structure and function, to present the basic biophysical models describing the electrical function of the cell membrane, and to solve problems and calculations concerning these models. In addition, the student will be able to make and present a short review and a talk on the basis of scientific literature or articles of this field.

Contents:

During the course the students will become acquainted with the central biophysical phenomena of the cell membrane, for example: the physical structure and properties of the cell membrane, lipids and proteins in the membrane, permeation and selectivity, ion channels and their kinetics. In addition they will learn to know the basics about the theory of the different cell membrane recording methods, the models describing the electrical function of the cell membrane and the analysis of cell membrane signals.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 34 h, calculation exercises 20 h, seminar 4 h, seminar presentation, weekly assignments, self-study 206 h

Target group:

Students of Biomedical physics (voluntary in BSc minor, mandatory in MSc). Also for the other students of the University of Oulu.

Prerequisites and co-requisites:

Introduction to biomedical physics (764163P) and Foundations of cellular biophysics (764115P) are recommended to be done before this course.

Recommended optional programme components:

764680 Neural information processing is recommended to be done after this course.

Recommended or required reading:

Lectures, lecture handouts; D. Johnston, S. Wu: Foundations of Cellular Neurophysiology, MIT Press, Cambridge MA, 1995 (partly); B. Hille: Ion channels of excitable membranes, Sinauer Associates Inc., Sunderland, Massachusetts USA, 3rd edition, 2001 (partly).

Assessment methods and criteria:

Home exam, final exam, seminar presentation

Grading:

Numerical grading scale 0 – 5, where 0 = failed

Person responsible:

Kyösti Heimonen

Working life cooperation:

No work placement period

Other information:

[Course website](#)

764322A: Cell membrane biophysics, 10 op

Voimassaolo: 01.01.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opettajat: Kyösti Heimonen

Opintokohteen kielet: Finnish

Leikkaavuudet:

764622S Molecular biophysics 10.0 op

ECTS Credits:

10 ECTS cr

Language of instruction:

English

Timing:

3rd-5th autumn (depending on whether included in BSc or MSc degree). Lectured every second year (during odd years).

Learning outcomes:

After finishing the course the student is able to describe the basics of cell membrane structure and function, to present the basic biophysical models describing the electrical function of the cell membrane, and to solve problems and calculations concerning these models. In addition, the student will be able to make and present a short review and a talk on the basis of scientific literature or articles of this field.

Contents:

During the course the students will become acquainted with the central biophysical phenomena of the cell membrane, for example: the physical structure and properties of the cell membrane, lipids and proteins in the membrane, permeation and selectivity, ion channels and their kinetics. In addition they will learn to know the basics about the theory of the different cell membrane recording methods, the models describing the electrical function of the cell membrane and the analysis of cell membrane signals.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 34 h, calculation exercises 20 h, seminar 4 h, seminar presentation, weekly assignments, self-study 206 h

Target group:

Students of Biomedical physics (voluntary in BSc minor, mandatory in MSc). Also for the other students of the University of Oulu.

Prerequisites and co-requisites:

Introduction to biomedical physics (764163P) and Foundations of cellular biophysics (764115P) are recommended to be done before this course.

Recommended optional programme components:

764680 Neural information processing is recommended to be done after this course.

Recommended or required reading:

Lectures, lecture handouts; D. Johnston, S. Wu: Foundations of Cellular Neurophysiology, MIT Press, Cambridge MA, 1995 (partly); B. Hille: Ion channels of excitable membranes, Sinauer Associates Inc., Sunderland, Massachusetts USA, 3rd edition, 2001 (partly).

Course material availability can be checked [here](#).

Assessment methods and criteria:

Home exam, final exam, seminar presentation

Grading:

Numerical grading scale 0 – 5, where 0 = fail

Person responsible:

Kyösti Heimonen

Working life cooperation:

No work placement period

Other information:

[Course website](#)

802338A: Complex Analysis II, 5 op

Voimassaolo: 01.06.2016 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

ECTS Credits:

5 credits

Contents:

like - terminating, non-terminating, irrationality, periodicity, approximation properties will be studied.

Person responsible:

Valery Serov

766663S: Computational physics and chemistry , 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opettajat: Perttu Lantto

Opintokohteen kielet: Finnish, English

ECTS Credits:

5 ECTS credits / 133 hours of work

Language of instruction:

English

Timing:

Every second year (odd year), spring

Learning outcomes:

After successful completion, student has a basic knowledge of computer simulation methods to study the microscopic systems (atoms, molecules and solids) in physics, chemistry, bio- and materials sciences. Student

understands the application possibilities and restrictions of the methods and has versatile capabilities to use them in solving of various problems.

Contents:

The course builds a foundation for further studies of computational physics and chemistry and the use of these methods in research. Subjects: electronic structure of finite systems, solid-state electronic structure, Monte Carlo and molecular dynamics simulations, quantum simulations.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 30 h, 4 practical works, self-study 103 h

Target group:

Advanced undergraduate students in physics, chemistry and materials sciences and graduate students.

Prerequisites and co-requisites:

Atomic Physics 1, Thermophysics, and Molecular Quantum Mechanics courses or comparable knowledge. Basic programming and computer abilities.

Recommended optional programme components:

No alternative course units or course units that should be completed simultaneously.

Recommended or required reading:

Lecture notes based on: Leach: Molecular Modelling: Principles and Applications, 2nd ed. (Prentice Hall, 2001). Jensen: Introduction to Computational Chemistry (Wiley, 1999). Allen and Tildesley: Computer Simulation of Liquids (Oxford, 1987). Atkins and Friedman: Molecular Quantum Mechanics, 4th ed. (Oxford, 2005). Thijssen: Computational Physics (Cambridge, 1999). Giordano and Nakanishi: Computational Physics, 2nd ed. (Pearson, 2006). Pang: An Introduction to Computational Physics, 2nd ed. (Cambridge, 2006). Hill, Subramanian, and Maiti: Molecular Modeling Techniques in Material Sciences, (CRC, Taylor&Francis, 2005).

Assessment methods and criteria:

One written examination.

Read more about assessment criteria at the University of Oulu webpage.

Grading:

Numerical grading scale 0 - 5, where 0 = fail

Person responsible:

Perttu Lantto

Working life cooperation:

No work placement period

Other information:

<https://wiki oulu.fi/display/761668S/>

802655S: Continued Fractions, 5 op

Voimassaolo: 01.01.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

5 credits

Language of instruction:

Finnish/English

Timing:

1. period

Learning outcomes:

We start our lectures by considering b-base expansions and simple continued fraction expansions of real numbers. The properties of these expansions like -terminating, non-terminating, irrationality, periodicity, approximation properties will be studied.

Next we investigate general continued fractions with corresponding recurrences and transformations. A particular attention is paid for convergence and irrationality criteria.

Further, expansions of hypergeometric series are presented which imply expansions to well-known Napier's constant and pi.

The research will be directed to more general irrationality questions and Diophantine equations, too.

Contents:

We start our lectures by considering b-base expansions and simple continued fraction expansions of real numbers. The properties of these expansions like - terminating, non-terminating, irrationality, periodicity, approximation properties will be studied.

Next we investigate general continued fractions with corresponding recurrences and transformations. A particular attention is paid for convergence and irrationality criteria. Further, expansions of hypergeometric series are presented which imply expansions to well-known Napier's constant and pi.

The research will be directed to more general irrationality questions and Diophantine equations, too.

Mode of delivery:

Lectures, Exercises.

Recommended or required reading:

G.H. Hardy & E.M. Wright: An Introduction to the Theory of Numbers.

Kenneth H. Rosen: Elementary number theory and its applications.

Lisa Lorentzen and Haakon Waadeland: Continued Fractions with Applications (1992).

Oskar Perron: Die Lehre von den Kettenbrüchen (1913).

[Course material](#)

Assessment methods and criteria:

Course exam

Grading:

1-5, fail

Person responsible:

Tapani Matala-aho

801698S: Cryptography, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opintokohteen oppimateriaali:

Trappe, Wade; Washington, Lawrence C., , 2005

Menezes, Alfred J.; van Oorschot, Paul C.; Vanstone, Scott A. , , 1997

Opintokohteen kielet: Finnish

Language of instruction:

Finnish/English

Learning outcomes:

As usual in my mathematical studies I shall be able to solve problems arising from the subject and to prove essential theorems starting from the given definitions using the tools applied in the course. More detailed; For example, when I pass the course with the grade 1/5, I shall recognize most definitions and I am able to solve closely related problems. Also I am able to rewrite short proofs with some understanding. When I pass the course with the grade 5/5, then I shall understand well the given definitions with the proofs of the theorems deduced from them. Further, I am able to solve challenging problems which demand independent deductions with several stages and applications of appropriate tools.

Contents:

In our lectures we study mathematical basics of encrypting, key exchange and signature systems. As examples, we mention elementary group and number theory used in primality tests and factoring, complexity estimates of computations-in particular in finite fields, repeated squaring and discrete logarithm in finite cyclic groups- applied in multiplicative groups of finite fields and addition groups of elliptic curves. Deduction of addition formulae in projective and affine Weierstrass elliptic curves. Diffie-Hellman key exchange, ElGamal encrypting and signature systems in finite cyclic groups applied in finite fields or in elliptic curves defined over finite fields. DSA, ECDSA, Massey-Omura. Some algorithms and tests: AKS, Fermat, Lenstra , Lucas, Miller-Rabin, Pohlig-Hellman, Pollard's p-1 and rho, pseudoprimes, quadratic sieve, Solovay-Strassen.

Learning activities and teaching methods:

28 h lectures, 14 h exercises

Target group:

Major and minor students

Prerequisites and co-requisites:

Basic in Algebra, Algebraic structures, Introduction to Cryptography, Field extensions

Recommended or required reading:

Lecture notes; Wade Trappe, Lawrence C. Washington: Introduction to cryptography : with coding theory; Alfred J. Menezes: Handbook of Applied Cryptography, CRC Press 1996(<http://www.cacr.math.uwaterloo.ca/hac/>)

Assessment methods and criteria:

Final exam

Grading:

Fail, 1-5

Person responsible:

Marko Leinonen

802671S: Data assimilation, 5 op

Voimassaolo: 01.01.2018 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opettajat: Lassi Roininen

Opintokohteen kielet: English, Finnish

ECTS Credits:

5 credits

Language of instruction:

Finnish/English depending on the audience

Learning outcomes:

- Student can model discrete and continuous time dynamical models and discrete and continuous time data
- Student can make a numerical implementation of the dynamical system with e.g. Matlab, R or Python
- Student can identify data assimilation applications, such as weather forecasting and climate change models

Contents:

- Basics: Bayes' theorem, Bayesian estimation, recursive estimation, continuous limits with Focker-Planck equation
- Kalman filter and its extensions: Extended Kalman filter (EKF), ensemble Kalman filter (EnKF) and variational Kalman filter (VKF)
- Variational data assimilation methods 3DVAR and 4DVAR
- Particle filter and Markov chain Monte Carlo methods
- Data visualisation and practical applications: weather forecasting, climate models and inverse problems

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

lectures 28 h and exercises 14 h

Target group:

Anyone interested in data assimilation

Prerequisites and co-requisites:

Basics of matrix computations and statistics, knowledge of Matlab, R, Python, or similar

Recommended or required reading:

- Kody Law, Andrew Stuart, Konstantinos Zygalakis, Data Assimilation - A mathematical introduction, Springer 2015.
- Simo Särkkä, Bayesian Filtering and Smoothing, Cambridge University Press 2013.

Assessment methods and criteria:

Final exam

Grading:

1-5, fail

Person responsible:

Lassi Roininen

792301A: Economic Geography and its Applications, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Geography

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS

Language of instruction:

The lectures and related materials are in English. The examination can be answered either in English or in Finnish. The essay and the seminar can be carried out in either in English or in Finnish.

Timing:

2nd year, 1st semester

Learning outcomes:

The course approaches economic geography as applied to the perspectives of regional development and policy. The aim of the course is to familiarize the student with current issues and related theoretical debates in economic geography. After the course, student is able to outline the main features of the central theories in economic geography, and to apply these theories in the context of regional development and policy.

Contents:

Lectures approach economic geography from varied angles, with emphasis on regional development and policy. The course material contains scientific papers connected to each lecture. The course also includes an essay and related seminar. In the essay and seminar, students deepen and enrich the content of the lectures by means of theoretical reflection and practical case studies.

Mode of delivery:

10 hours of lectures (in English), article package, examination and practicals (an essay and a seminar). Participation in the lectures is obligatory.

Learning activities and teaching methods:

Lectures, essay and seminar

Target group:

Obligatory for students of the regional development and regional policy, for others voluntary.

Prerequisites and co-requisites:

-

Recommended optional programme components:

The course is part of minor studies of regional development and regional policy.

Recommended or required reading:

Lectures and articles.

Assessment methods and criteria:

Examination, essay and seminar

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

Grading:

1–5.

Person responsible:

Toni Ahlvist

Working life cooperation:

No.

Other information:

Exchange students are asked to contact Toni Ahlvist before taking the course.

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

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

751354A Examinations on optional topics 2.0 op

752352A Examination in optional topics 2.0 op

753351A Examinations on optional topics 2.0 op

ECTS Credits:

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

Language of instruction:

Depends on the book.

Timing:

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

Learning outcomes:

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

Contents:

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

Mode of delivery:

Independent studying: book exam.

Learning activities and teaching methods:

Book exam in Examinarium.

Target group:

-

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Literature chosen in agreement with the responsible teacher.

Assessment methods and criteria:

Book exam in Examinarium.

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

Grading:

1-5 / Fail.

Person responsible:

Prof. Jari Oksanen (ECOb), Prof. Timo Muotka (ECOa), Doc. Kari Taulavuori (ECOb), Doc. Seppo Rytönen (ECOa), Doc. Annamari Markkola (ECOb), Prof. Outi Savolainen (BSg) and Prof. Hely Häggman (BSb).

Working life cooperation:

-

Other information:

-

791610S: Final examination, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Geography

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS

Language of instruction:

Finnish and English.

Timing:

(1st or) 2nd year, 1st or 2nd semesters (autumn or spring semesters)

Learning outcomes:

After the exam of this course, the student can define, interpret and evaluate thoughtfully about his/her field of specialisation and its research traditions, contemporary themes of research and future prospects. Recommended or required readings will deepen students' geographical knowledge in his/her special field ("home module").

Contents:

Written exam on readings that are related to the Master thesis.

Mode of delivery:

Book exam.

Learning activities and teaching methods:

Book exam.

Target group:

Obligatory to all students in Geography.

Prerequisites and co-requisites:

-

Recommended optional programme components:

—

Recommended or required reading:

Contact your own professor.

Assessment methods and criteria:

Written exam on examinarium.

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

Grading:

1-5.

Person responsible:

Professors; DD Jarkko Saarinen

Working life cooperation:

No.

802647S: Fourier series and the discrete Fourier transform, 10 op

Voimassaolo: 01.01.2010 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opettajat: Valeriy Serov

Opintokohteen kielet: English

802650S: Fractal Geometry, 10 op

Voimassaolo: 01.01.2010 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opettajat: Esa Järvenpää

Opintokohteen kielet: Finnish

Learning outcomes:

After passing the course the student -is able to use the central methods in fractal geometry -can determine different dimensions - knows the basic properties of dimensions

Contents:

Fractals are irregular sets having varying structure at all scales. Fractal geometry is a branch of mathematics where geometric properties of fractals are studied. Fractal are used in various fields of mathematics as well a in applications. The course concentrates on basics tools of fractal geometry including different concepts of dimension.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

56 h lectures, 28 h exercises, 182 h independent study

Target group:

Mathematics majors

Prerequisites and co-requisites:

Measure and integration

Assessment methods and criteria:

Final exam

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

Grading:

Fail, 1-5

Person responsible:

Esa Järvenpää

755324A: Functional animal ecology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Seppo Rytönen

Opintokohteen kielet: Finnish

Leikkaavuudet:

751378A Functional animal ecology 6.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Lectures in Finnish, exercises in Finnish / English.

Timing:

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

Learning outcomes:

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

Contents:

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

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

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

Target group:

Recommended for ecology students.

Prerequisites and co-requisites:

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

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Essay or exam.

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

Grading:

1-5 / Fail.

Person responsible:

Doc. Seppo Rytönen.

Working life cooperation:

No.

Other information:

-

790101P: GIS-basics and Cartography, 5 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Geography

Arvostelu: 1 - 5, pass, fail

Opettajat: Harri Antikainen

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay790101P GIS-basics and Cartography (OPEN UNI) 5.0 op

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

5 ECTS

Language of instruction:

Finnish, partly in English. English speaking students are asked to contact prof. Rusanen before the course.

Timing:

1 year, 2nd semester

Learning outcomes:

Course gives basic information about Geographical Information System and about the theory of cartography. After the course the student can use ArcGIS program and he/she is able to produce cartographic presentations.

Contents:

Basics of GIS, theories of cartography and statistical graphics and use of ArcGIS program.

Mode of delivery:

Face-to-face learning.

Learning activities and teaching methods:

16 h lectures, 56 h practicals.

Target group:

Common course to all 1st year students of Geography.

Prerequisites and co-requisites:

-

Recommended optional programme components:

Course is part of the minor studies of GIS.

Recommended or required reading:

Paul A Longley, Michael G Goodchild, David J. Maguire & David W. Rhind (2005). Geographic Information Systems and Science. 2nd edition. 516 p

Assessment methods and criteria:

Exam on exam day.

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

Grading:

1–5.

Person responsible:

Harri Antikainen

Working life cooperation:

No

Other information:

English speaking students are asked to contact Harri Antikainen before the course.

790101P-01: GIS-basics and Cartography, exercises, 0 op

Voimassaolo: - 31.07.2019

Opiskelumuoto: Basic Studies

Laji: Partial credit

Vastuuyksikkö: Field of Geography

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

790101P-02: GIS-basics and Cartography, lectures, 0 op

Voimassaolo: - 31.07.2019

Opiskelumuoto: Basic Studies

Laji: Partial credit

Vastuuyksikkö: Field of Geography

Arvostelu: 1 - 5, pass, fail

Opettajat: Rusanen Jarmo Juhani

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

765309A: Galaxies, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opettajat: Sébastien Comerón Limbourg

Opintokohteen kielet: English

Leikkaavuudet:

765630S Galaxies 6.0 op

765330A Galaxies and cosmology 6.0 op

ECTS Credits:

5 ECTS credits /133 hour of work

Language of instruction:

English

Timing:

2nd - 4th year, Autumn 2018, period 2.

Learning outcomes:

Student recognizes the main components of galaxies and can apply them to classify galaxies. Student can describe the theories of formation of galactic structures. Student can solve mathematical problems related to the course and recognizes the terminology well enough to be able to read scientific publications.

Contents:

We begin with the classification of galaxies, which introduces many of the concepts needed in the course. Most of the large galaxies are either spiral galaxies or elliptical galaxies. We study the structure and kinematics in both these galaxy types, including the theories of spiral formation. Especial emphasis is placed on our own galaxy, the Milky Way. We also examine the structure in larger scale: groups and clusters of galaxies.

Mode of delivery:

Face-to-face-teaching

Learning activities and teaching methods:

Lectures 36 h, exercises, self-study 107 h

Target group:

Primarily for the students of the degree programme in physics. Also for the other students of the University of Oulu.

Prerequisites and co-requisites:

Fundamentals of astronomy (recommended)

Recommended optional programme components:

No alternative course units or course units that should be completed simultaneously.

Recommended or required reading:

Sparke, L., Gallagher, J.: Galaxies in the Universe, Cambridge, 2nd ed., 2007. Course material availability can be checked here.

Assessment methods and criteria:

One written examination. Read more about assessment criteria at the University of Oulu webpage.

Grading:

Numerical grading scale 0 – 5, where 0 = fail

Person responsible:

Sébastien Comerón

Working life cooperation:

No work placement period

Other information:

The course is lectured next time autumn 2018, periods 1-2

790340A: Geographies of global development, 5 op**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Field of Geography**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Juha Ridanpää**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

ay790340A Geographies of global development (OPEN UNI) 5.0 op

ECTS Credits:

5 ECTS

Language of instruction:

Finnish or English.

Timing:

2nd or 3rd year, 1st or 2nd semesters (autumn or spring semesters).

Learning outcomes:

This course gives knowledge of global development problems from geographical point of view. After the course the student can explain what development indicates and what kind of social and economic phenomena will explain both development and under development. He/she is also able to compare different actions that are aimed to diminish the uneven development based on different theories and strategies.

Contents:

The course familiarizes students to the theories that aim to explain differences in uneven development. Under development, and its social, cultural and economic aspects will be studied from national, regional and local level. This course also requires to political programs and strategies that are aimed to stabilize equalizes uneven development.

Mode of delivery:

Book exam.

Learning activities and teaching methods:

Book exam.

Target group:

Compulsory for teachers, others obligatory.

Prerequisites and co-requisites:

-

Recommended optional programme components:

-

Recommended or required reading:

- Potter, R.B.T, T. Binns, J.A.Elliot & D.Smith (2004). Geographies of development.

Assessment methods and criteria:

Exam on examinarium.

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

1–5.

Person responsible:

Juha Ridanpää

Working life cooperation:

No.

76656S: Heliospheric physics, 8 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

8 credits

Language of instruction:

English

Timing:

Roughly every third year.

Learning outcomes:

After passing the course the student is able to describe in physical terms the structure of solar corona, the origin, properties and temporal variability of solar wind and heliospheric magnetic field, and the global structure of the heliosphere. The student is able to apply physical theories describing the acceleration of solar wind and the structure of the heliospheric magnetic field to explain heliospheric phenomena.

Contents:

This is an optional physics course at an advanced level on heliospheric physics. The space controlled by the solar magnetic field is called the heliosphere, extending beyond the planetary system. Solar magnetic field is carried by the solar wind, a particle stream originating in the solar corona. The properties of the solar wind and its magnetic field change with solar activity and affect the planetary magnetospheres and atmospheres, causing for example magnetic storms.

Contents briefly: Properties of solar wind, Parker's theory of solar wind, solar wind acceleration, the three-dimensional structure of the heliosphere, heliospheric current sheet, corotating shocks, coronal mass ejections and magnetic clouds, merged interaction regions, termination shock, heliopause, solar magnetic cycle and its effects in the heliosphere, north-south asymmetry, space weather and space climate.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 44 h, 10 exercises (20 h), self-study 149 h

Target group:

Recommended especially for students of space physics, astronomy and theoretical physics.

Prerequisites and co-requisites:

Recommended courses: 766355A Basics of space physics or 761353A Basics of plasma physics, or equivalent knowledge.

Recommended optional programme components:

No alternative course units or course units that should be completed simultaneously

Recommended or required reading:

Parts of books: Kivelson-Russell, Introduction to Space Physics, Cambridge Univ. Press, 1995; J.R. Jokipii et al, Cosmic winds and the heliosphere, Univ. Arizona, 1997; Prölss, Physics of the Earth's space environment; K. Scherer et al., The outer heliosphere: Beyond the planets, Copernicus, 2000.

Lecture notes: K. Mursula: Heliospheric physics.

Course material availability can be checked [here](#)

Assessment methods and criteria:

One final examination

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

Grading:

Numerical grading scale 0 – 5, where 0 = fail

Person responsible:

prof. Kalevi Mursula and Dr. Alex Mishev

Working life cooperation:

No work placement period

Other information:

First lectures on Wednesday 5.9. and Thursday 6.9. at 10.15 in B234.

<https://wiki oulu.fi/display/76656S/>

756355A: Identification of plant species, brief, 3 op**Voimassaolo:** 01.08.2017 -**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Field of Biology**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Annamari Markkola**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

756342A Identification of plant species 3.0 op

ECTS Credits:

3 ECTS credits / 80 hours of work.

Language of instruction:

Finnish / English.

Timing:

BSc 1st autumn.

Learning outcomes:

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

Contents:

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

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

16 h demonstrations and learning from the herbarium samples. 350 plant species. In the identification exam student has to know specimens scientific name and family in latin.

Target group:

BSc degree, BS: compulsory 3 cr.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Booklet Hanhela, P. & Halonen, P. 1995: Plant Identification.

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

Two species identification subexams (756355A-01 and 756355A-02) 3 cr with the help of handout.

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

1-5 / Fail.

Person responsible:

Doc. Annamari Markkola

Working life cooperation:

No.

Other information:

-

*Compulsory***756355A-01: Identification of plant species, monocotyledons, brief, 0 op****Voimassaolo:** 01.08.2017 -**Opiskelumuoto:** Intermediate Studies**Laji:** Partial credit**Vastuuyksikkö:** Field of Biology**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Annamari Markkola**Opintokohteen kielet:** Finnish

Ei opintojaksokuvauksia.

756355A-02: Identification of plant species, dicotyledons, brief, 0 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Annamari Markkola

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

756354A-02: Identification of plant species, dicotyledons, extensive, 0 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Annamari Markkola

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

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

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Annamari Markkola

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

BSc 1st autumn.

Learning outcomes:

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

Contents:

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

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

16 h demonstrations and learning from the herbarium samples. 350 plant species. In the identification exam student has to know specimens scientific name and family in latin.

Target group:

BSc degree: ECO and TEA 5 cr compulsory.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

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

Recommended or required reading:

Booklet Hanhela, P. & Halonen, P. 1995: Plant Identification.

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

Assessment methods and criteria:

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

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

Grading:

1-5 / Fail.

Person responsible:

Doc. Annamari Markkola.

Working life cooperation:

No.

Other information:

-

756354A-01: Identification of plant species, monocotyledons, extensive, 0 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Annamari Markkola

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

791633S: International lectures, 2 op

Voimassaolo: - 31.07.2020

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Geography

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

2 ECTS

Language of instruction:

Finnish or English.

Timing:

1st or 2nd MSc-year, 1st or 2nd semester.

Learning outcomes:

With international lectures the student can evaluate and compare different research fields of geography.

Contents:

The aim of the course is to integrate the visiting scholars' (Erasmus or other) teaching to the teaching.

International lectures give wider picture about research and teaching of Geography in other countries and traditions.

Mode of delivery:

Face-to-face learning.

Learning activities and teaching methods:

Students must take part to seven (7) lectures which are 1–2 hours per each. Based on those lectures, the student will make a report in Finnish or in English. Lectures can be collected during several years. However, if certain lecture is part of his/her normal or obligatory studies in Geography, it cannot be combined to this course.

Target group:

Voluntary.

Prerequisites and co-requisites:

-

Recommended optional programme components:

This course may include lectures from other courses or departments.

Recommended or required reading:

-

Assessment methods and criteria:

Study diary based on lectures.

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

Grading:

Pass/failed.

Person responsible:

-

Working life cooperation:

No.

Other information:

-

802668S: Introduction to Functional Analysis, 5 op

Voimassaolo: 01.06.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

ECTS Credits:

5 ECTS cr

Language of instruction:

English

Timing:

4th year

Learning outcomes:

This is an introduction course, it includes normed spaces, subspaces, quotients, bounded linear operators and functionals, Banach duals, uniform boundedness principle, open mapping theorem and Hahn-Banach theorem. If time permits, reflexive spaces will also be studied.

Contents:

Definition of normed spaces. Examples. Quotient spaces. Bounded linear operators. Banach duals. Uniform bounded principle. Open mapping theorem. Hahn-Banach theorem. Reflexive spaces.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

28 h lectures, 14 h exercises.

Target group:

Students with some background on topology.

Recommended or required reading:

Lecture notes by Filali

Assessment methods and criteria:

Final Exam

Grading:

Fail, 1-5

Person responsible:

Mahmoud Filali

Working life cooperation:

No

Other information:

Lecture in English /questions can be done in Finnish, exam in English/Finnish

800149P: Introduction to LateX, 2 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

761115P Laboratory Exercises in Physics 1 5.0 op

761115P-03 Laboratory Exercises in Physics 1, Introduction to LateX 0.0 op

ECTS Credits:

2 ECTS cr

Language of instruction:

Finnish (in english if needed)

Timing:

2-3 year of studies, before making the Bachelor's thesis.

Learning outcomes:

After completing the course, student

- is able to describe the principles of LaTeX document preparation system
- can form basic template of LaTeX document and modify it to his/her needs
- knows basic commands when writing mathematical text
- is able to use different environments (e.g. enumerations, equations)
- can recognize and fix errors in LaTeX code
- is able to write Bachelor's and Master's thesis using LaTeX

Contents:

Bachelor's and Master's thesis are written using LaTeX document preparation system. This course introduces basics in LaTeX by giving basic knowledge of the principles of LaTeX.

Mode of delivery:

Lectures / exercises (computer class)

Learning activities and teaching methods:

Face-to-face teaching

Target group:

Major students

Prerequisites and co-requisites:

First year math studies

Recommended optional programme components:

Must be completed before Bachelor's thesis.

Recommended or required reading:

Lecture notes

Tobias Oetiker Hubert Partl, Irene Hyna and Elisabeth Schlegl, *The Not So Short Introduction to LATEX2#* (<http://tobi.oetiker.ch/lshort/lshort.pdf>)

Kopka, H. and Daly, P. W., *Guide to LaTeX (4th Edition)*, Addison-Wesley Professional, 2003

Assessment methods and criteria:

Participation in lectures/exercises and home work.

Grading:

Pass/Fail

Person responsible:

Markus Harju

Working life cooperation:

-

756650S: Introduction to molecular ecology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kvist, Laura Irmeli, Lumi Viljakainen

Opintokohteen kielet: English

Leikkaavuudet:

750645S Molecular ecology 2.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

English.

Timing:

B.Sc. 2nd spring or M.Sc. 1st spring, ECOGEN ECO and BS.

Learning outcomes:

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

Contents:

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

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

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

Target group:

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

Prerequisites and co-requisites:

Concepts of genetics (757109P), Experimental course in general genetics (757110P) and Molecular evolution (757312A) or equivalent knowledge.

Recommended optional programme components:

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

ECOGENeco: Basics in population ecology (756351A).

Recommended or required reading:

Beebe, T and Rowe G. 2004 or 2008. An introduction to molecular ecology. Oxford University Press.

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

Assessment methods and criteria:

Final exam and seminar.

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

Grading:

1-5 / Fail.

Person responsible:

Doc. Laura Kvist.

Working life cooperation:

No.

Other information:

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

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

Voimassaolo: 01.08.2015 - 31.07.2019

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Lumi Viljakainen, Kvist, Laura Irmeli

Opintokohteen kielet: English

Ei opintojaksokuvauksia.

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

Voimassaolo: 01.08.2015 - 31.07.2019

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Lumi Viljakainen, Kvist, Laura Irmeli

Opintokohteen kielet: English

Ei opintojaksokuvauksia.

790102P: Introduction to the systematic Physical Geography, 5 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Geography

Arvostelu: 1 - 5, pass, fail

Opettajat: Jan Hjort

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay790102P Introduction to the systematic physical geography (OPEN UNI) 5.0 op

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

5 ECTS cr

Language of instruction:

Finnish and English (Lectures are only in Finnish, but this course can be completed also in English with some extra readings. Practicals are also organized in English.)

Timing:

1 year, 2nd semester

Learning outcomes:

This introductory course will give information about systematic fields of Physical Geography and its contemporary research. After the course, the student recognizes the most essential phenomena of geosphere (geomorphology), hydrosphere (hydrogeography), biosphere (biogeography), atmosphere (climatology), and he/she is able to do conclusions about the factors that influence those phenomena. The aim of the practical's is that the student can use basic methods of the research of Physical Geography.

Contents:

Geomorphology, climatology, hydrogeography, biogeography; and geosphere, atmosphere, hydrosphere and biosphere. The students will learn how nature works and how to resolve multiple environmental questions. Practical's are focused to the importance of the material compilation and its technical use.

Mode of delivery:

Face-to-face learning.

Learning activities and teaching methods:

20 h lectures, 56 h practicals.

Target group:

Common course to all 1st year students of Geography.

Prerequisites and co-requisites:

Recommended optional programme components:

Course is part of the minor studies of Geography.

Recommended or required reading:

- Strahler, Alan (2013). Introducing Physical Geography.
- More material from the practicals.

Assessment methods and criteria:

Exam on an exam day.

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

Grading:

1–5.

Person responsible:

Jan Hjort and Olli-Matti Kärnä

Working life cooperation:

No.

Other information:

Exchange students are asked to contact prof. Hjort before the course.

802661S: Inverse problems, 5 op

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

5 ects

Language of instruction:

Finnish/English

Learning outcomes:

Students can identify inverse problems, and methods used in solving them. Student will be able to make a numerical implementation with Matlab, R or Python.

Contents:

Contents: - Linear inverse problems, Moore-Penrose inverse, matrix norms, condition number, decompositions (SVD, QR), truncated SVD, Moore-Penrose inverse, Tikhonov regularisation, CG and CGLS methods - Statistical inverse problems, linear and non-linear inversion, Gaussian priors - Radar and tomography applications

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

28 h lectures, 14 h exercises

Target group:

Anyone interested in inverse problems

Prerequisites and co-requisites:

Basics of matrix computations and statistics, knowledge of Matlab, R, Python, or similar

Recommended or required reading:

J. Kaipio and E. Somersalo, Statistical and Computational Inverse Problems, Springer 2005.

Assessment methods and criteria:

Final exam

Grading:

1-5, fail

Person responsible:

Lassi Roininen

766675S: Laser and synchrotron radiation physics, 10 op

Voimassaolo: 01.01.2016 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Leikkaavuudet:

761675S Laser and synchrotron radiation physics 6.0 op

ECTS Credits:

10 ECTS credits

Language of instruction:

English / Finnish

Timing:

During masters degree studies. Not lectured every year.

Learning outcomes:

- Student will be able to apply the basic physical principles of electromagnetism, special relativity and quantum mechanics to analyse lasers and synchrotron radiation light sources.
- Student will know all the fundamental components included in lasers and synchrotron radiation light sources.
- Student will be able to explain the special characteristics of laser and synchrotron radiation, their differences and similarities and how they can be altered at will.
- Student will be able to name and describe example application areas of lasers and synchrotron radiation light sources.

Contents:

The course consists of two broad subjects: laser physics and synchrotron radiation physics. In the first part, theory for laser action is developed from classical electromagnetic field theory and quantum mechanics. Requirements for materials and operation of lasers as well as properties of laser radiation are described in detail. Main laser types with low and high density gain media are introduced. Some real life applications of lasers are introduced via visits to different laboratories hosting laser equipment within University of Oulu.

The second part of the course starts with a revision of special relativity and introduction to particle accelerators. Generation and properties of radiation by relativistic charged particles, synchrotron radiation, is described quantitatively using relativistic electromagnetic field theory. The course ends with a qualitative treatment of free-electron lasers which represent the most recent generation of light sources combining elements from laser and particle accelerator based light sources.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

50 h of lectures, 24 h of exercises, 193 h of self-study

Target group:

Primarily for physics degree students. Also for other students with solid physics background.

Prerequisites and co-requisites:

All intermediate level compulsory physics courses (*e.g.* atomic physics 1, electromagnetism, structure of matter, wave motion and optics, introduction to relativity) including quantum mechanics I.

Recommended optional programme components:

No alternative course units or course units that should be completed simultaneously.

Recommended or required reading:

L. Hautala: Laser and synchrotron radiation physics (2016) lecture notes which are based on the books: Laser fundamentals by William T. Silfvast (Cambridge University Press, 2nd edition) and Particle Accelerator Physics by Helmut Wiedemann (Springer, 3rd edition).

Assessment methods and criteria:

Two written intermediate examinations or one final examination.

Grading:

Numerical grading scale 0 - 5, where 0 = fail.

Person responsible:

Lauri Hautala

Working life cooperation:

No work placement period.

Other information:

[Course wiki page](#)

802320A: Linear Algebra, 5 op

Voimassaolo: 01.06.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

802119P Linear Algebra II 5.0 op

ECTS Credits:

5 ECTS cr

Language of instruction:

Finnish and English

Timing:

2nd year, 2nd period

Learning outcomes:

On successful completion of this course, the student will be able to

- apply the definition of linear space and concepts associated with linear spaces such as basis
- work with linear mappings and their matrix representations
- apply the definition of inner product space and concepts associated with inner product spaces such as orthogonality
- prove results related to linear spaces

Contents:

The aim of the course is to provide the student with the knowledge needed in almost all later courses in mathematics: abstract vector spaces and subspaces, linear independence and bases, inner product spaces, linear mappings and concepts associated with linear mappings such as kernel, eigenvalues and eigenvectors.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

28 h lectures, 14 h exercises, 91 h independent study

Target group:

Mathematics majors and minors students

Prerequisites and co-requisites:

802120P Introduction to Matrices

Recommended optional programme components:

-

Recommended or required reading:

<http://cc.oulu.fi/~tma/OPETUS.html>

Assessment methods and criteria:

Final exam

Grading:

1-5, fail

Person responsible:

Tapani Matala-aho

Working life cooperation:

No

Other information:

-

752316A: Macro fungi, 3 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Annamari Markkola

Opintokohteen oppimateriaali:

Salo, Pertti (1) , , 2006

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay752316A Macro fungi (OPEN UNI) 3.0 op

ECTS Credits:

3 ECTS credits / 80 hours of work.

Language of instruction:

Finnish / English.

Timing:

B.Sc. 3 rd autumn. NNE.

Learning outcomes:

Student is able to identify most common macrofungal species as fresh specimens and knows basics of fungal ecology.

Contents:

Demonstrations of macrofungi in the field, basics of identification, ecology and distribution.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

14 h lectures, 25 h exercises including excursions, identification exam.

Target group:

Optional.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Course handout, Salo, P. and Nummela-Salo, U. 2002: Sienikurssi (752316). Toinen uusittu painos. Lajiesittelyt. Biologian laitoksen monisteita 2/2002, 41 p. and mushroom guides.

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

Assessment methods and criteria:

Species identification exam.

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

Grading:

1-5 / Fail.

Person responsible:

Doc. Annamari Markkola.

Working life cooperation:

No.

Other information:

-

761657S: Magnetospheric physics, 8 op**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Field of Physics**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**ECTS Credits:**

8 ECTS cr

Language of instruction:

English

Timing:

Roughly every third year.

Learning outcomes:

After passing the course the student is able to describe the formation of the magnetosphere as an interaction between solar wind and planetary magnetic field, to explain in physical terms the essential factors and phenomena of magnetospheric structure and dynamics, to compare different magnetospheres, and to apply basic methods of space plasmas to describe magnetospheric phenomena.

Contents:

This is an optional physics course at an advanced level on magnetospheric physics. A magnetosphere is made by the interaction between a planet's internal magnetic field and the interplanetary magnetic field carried by the solar wind. This interaction forms a comet-like magnetic bubble, whose size, shape and structure vary constantly, depending on the conditions of solar wind and the interplanetary magnetic field.

Contents briefly: Formation of a magnetosphere, Chapman-Ferraro model, magnetospheric boundaries, tail and cusp, magnetospheric plasmas and current systems, reconnection of magnetic fields, magnetosphere-ionosphere coupling, magnetospheric dynamics (magnetic activity, auroras, substorm process, magnetic storms), other planetary magnetospheres.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 44 h, 10 exercises (20 h), self-study 149 h

Target group:

Recommended especially for students of space physics, astronomy and theoretical physics. Also for the other students of the University of Oulu.

Prerequisites and co-requisites:

Recommended courses: 766355A Basics of space physics or 761353A Basics of plasma physics, or equivalent knowledge.

Recommended optional programme components:

No alternative course units or course units that should be completed simultaneously

Recommended or required reading:

Parts of books: H. Koskinen, Johdatus plasmafysiikkaan ja sen avaruussovellutuksiin. Limes, 2001; Prölss, Physics of the Earth's space environment, Springer, 2004; G. Parks, Physics of space plasmas. An introduction, Addison-Wesley, 1991; Kivelson-Russell, Introduction to space physics, Cambridge Univ. Press, 1995.

Lecture notes: K. Mursula: Magnetosfäärifysiikka.

Course material availability can be checked [here](#).

Assessment methods and criteria:

One written examination

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

Grading:

Numerical grading scale 0 – 5, where 0 = fail

Person responsible:

Timo Asikainen

Working life cooperation:

No work placement period

Other information:

<https://wiki oulu.fi/display/761657S/>

761118P: Mechanics 1, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opettajat: Vaara, Juha Tapani

Opintokohteen kielet: Finnish

Leikkaavuudet:

766343A	Mechanics	7.0 op
761111P	Basic mechanics	5.0 op
761101P	Basic Mechanics	4.0 op
766323A	Mechanics	6.0 op
761323A	Mechanics	6.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work

- 761118P-01, Lectures and exam (4 cr)

- 761118P-02, Lab. exercises (1 cr)

Language of instruction:

The lectures will be in Finnish. The textbook is in English and exercises are selected from the textbook. For further information, contact the responsible person of the course.

Timing:

Autumn

Learning outcomes:

The student is able to describe the basic concepts of mechanics and to apply those when solving the problems related to mechanics.

Contents:

We encounter many phenomena related to mechanics in our everyday life. Most engineering sciences are based on mechanics and mechanics forms the basis of many other fields of physics, including modern physics. Contents in brief: Short summary of vector calculus. Kinematics, projectile motion and circular motion. Newton's laws of motion. Work and different forms of energy. Momentum, impulse and collisions. Rotational motion and moment of inertia. Torque and angular momentum. Rigid body equilibrium problems. Gravitation. Periodic motion. Fluid mechanics.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 30 h, 7 exercises (14 h), 2 laboratory exercises (3 hours/exercise), self-study 83 h

Target group:

For the students of the University of Oulu.

Prerequisites and co-requisites:

Knowledge of vector calculus and basics of differential and integral calculus.

Recommended optional programme components:

No alternative course units or course units that should be completed simultaneously.

Recommended or required reading:

Text book: H.D. Young and R.A. Freedman: University physics, Addison-Wesley, 13th edition, 2012, chapters 1-14. Also older editions can be used. Lecture material: Finnish lecture material will be available on the web page of the course.

Assessment methods and criteria:

Both parts (761118P-01 and 761118P-02) will be graded separately. The final grade of the course is the weighted average of the grades of part 1 (4 cr) and part 2 (1 cr).

761118P-01: Three midterm exams or final examination

761118P-02: Two laboratory exercises

Read more about assessment criteria at the University of Oulu webpage.

Grading:

Numerical grading scale 0 – 5, where 0 = fail

Person responsible:

Juha Vaara

Working life cooperation:

No work placement period

Other information:

<https://wiki oulu.fi/display/761118P>

Compulsory

761118P-01: Mechanics 1, lectures and exam, 0 op

Voimassaolo: 01.01.2017 -

Opiskelumuoto: Basic Studies

Laji: Partial credit

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opettajat: Vaara, Juha Tapani

Opintokohteen kielet: Finnish

Leikkaavuudet:

766343A Mechanics 7.0 op

761111P-02 Basic mechanics, lab. exercises 0.0 op

761111P-01 Basic mechanics, lectures and exam 0.0 op

761111P Basic mechanics 5.0 op

761121P	Physical Measurements I	3.0 op
761101P	Basic Mechanics	4.0 op
761323A	Mechanics	6.0 op
766323A	Mechanics	6.0 op

Language of instruction:

The lectures will be in Finnish. The textbook is in English and exercises are selected from the textbook. For further information, contact the responsible person of the course.

Timing:

Autumn

Learning outcomes:

The student is able to describe the basic concepts of mechanics and to apply those when solving the problems related to mechanics.

Contents:

We encounter many phenomena related to mechanics in our everyday life. Most engineering sciences are based on mechanics and mechanics forms the basis of many other fields of physics, including modern physics. Contents in brief: Short summary of vector calculus. Kinematics, projectile motion and circular motion. Newton's laws of motion. Work and different forms of energy. Momentum, impulse and collisions. Rotational motion and moment of inertia. Torque and angular momentum. Rigid body equilibrium problems. Gravitation. Periodic motion. Fluid mechanics.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

The whole course: Lectures 30 h, 7 exercises (14 h), 2 laboratory exercises (3 hours/exercise), self-study 83 h

Target group:

For the students of the University of Oulu

Prerequisites and co-requisites:

Knowledge of vector calculus and basics of differential and integral calculus.

Recommended optional programme components:

No alternative course units or course units that should be completed simultaneously

Recommended or required reading:

Text book: H.D. Young and R.A. Freedman: University physics, Addison-Wesley, 13th edition, 2012, chapters 1-14. Also older editions can be used. Lecture material: Finnish lecture material will be available on the web page of the course.

Assessment methods and criteria:

761118P-01: Three midterm exams or final examination

Grading:

Numerical grading scale 0 – 5, where 0 = fail

Person responsible:

Juha Vaara

Working life cooperation:

No work placement period

Other information:[Course website](#)

Both parts (761118P-01 and 761118P-02) will be graded separately. The final grade of the course is the weighted average of the grades of part 1 (4 cr) and part 2 (1 cr).

761118P-02: Mechanics 1, lab. exercises, 0 op

Voimassaolo: 01.01.2017 -

Opiskelumuoto: Basic Studies

Laji: Partial credit

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

766343A	Mechanics	7.0 op
761111P-01	Basic mechanics, lectures and exam	0.0 op
761111P-02	Basic mechanics, lab. exercises	0.0 op
761111P	Basic mechanics	5.0 op
761101P	Basic Mechanics	4.0 op
761323A	Mechanics	6.0 op
766323A	Mechanics	6.0 op

Timing:

Autumn

Learning outcomes:

The student is able to describe the basic concepts of mechanics and to apply those when solving the problems related to mechanics.

Contents:

We encounter many phenomena related to mechanics in our everyday life. Most engineering sciences are based on mechanics and mechanics forms the basis of many other fields of physics, including modern physics. Contents in brief: Short summary of vector calculus. Kinematics, projectile motion and circular motion. Newton's laws of motion. Work and different forms of energy. Momentum, impulse and collisions. Rotational motion and moment of inertia. Torque and angular momentum. Rigid body equilibrium problems. Gravitation. Periodic motion. Fluid mechanics.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

The whole course: Lectures 30 h, 7 exercises (14 h), 2 laboratory exercises (3 hours/exercise), self-study 83 h

Target group:

For the students of the University of Oulu

Prerequisites and co-requisites:

Knowledge of vector calculus and basics of differential and integral calculus.

Recommended optional programme components:

No alternative course units or course units that should be completed simultaneously.

Other information:

[Course website](#)

791626S: Methodological special themes in Physical Geography, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Geography

Arvostelu: 1 - 5, pass, fail

Opettajat: Jan Hjort

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

Required proficiency level:

Quantitative research methods in Geography

ECTS Credits:

5 ECTS

Language of instruction:

Finnish and English if needed.

Timing:

1st or 2nd MSc-year, 2nd semester.

Learning outcomes:

The objective is that the student can critically apply statistically-based spatial modelling methods to solve study problems in Physical Geography, understands the principles of the modelling techniques and acknowledges the importance of theory in scientific research.

Contents:

A special course that focuses on regression-based spatial modelling in Physical Geography. Spatial analysis and modelling are central development fields in Physical Geography. The course offers methodological knowledge for the preparation of MSc and doctoral thesis.

Mode of delivery:

Face-to-face learning.

Learning activities and teaching methods:

Lectures, practicals and practical work

Target group:

MSc students in Physical Geography.

Prerequisites and co-requisites:

Course Quantitative research methods in Geography have to be done.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Written report.

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

1-5.

Person responsible:

Professor Hjort and PhD student in Physical Geography.

Working life cooperation:

No.

Other information:

Course will be organized in English if needed.

755325A: Methods in ecology I, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Koivula, Seppo Rytönen

Opintokohteen kielet: Finnish

Leikkaavuudet:

750347A Ecological methods I 6.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

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

Learning outcomes:

Students are familiar to scientific method and can separate scientific information from other contents of culture. Students have learned to assess the uncertainty of information and can evaluate the quality of information with respect to its applied value. Students also learn to build a valid theoretical or empirical strategy to solve scientific problems.

Contents:

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

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures, seminar, exercises and exam.

Target group:

Compulsory to ECO.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Exam.

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

Grading:

1-5 / Fail.

Person responsible:

Doc. Kari Koivula and Doc. Seppo Rytönen.

Working life cooperation:

No.

Other information:

-

755329A: Methods in ecology II, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Seppo Rytönen

Opintokohteen kielet: Finnish

Leikkaavuudet:

750647S Methods in ecology II 7.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Lectures Finnish / English, exercises also in English.

Timing:

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

Learning outcomes:

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

Contents:

Continuation to course Ecological methods I 5cr (755325A, 755625S). This course focuses on applying the scientific method in ecological research. The course consists mainly of computer exercises in the following

subjects: sampling, sample size determination, experimental design and statistical analysis esp. analysis of variance, comparative methods (independent contrasts - analysis), multivariate methods (cluster analysis, ordination) and meta-analysis. Also other current issues can be included.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

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

Target group:

ECOGEN ECO compulsory.

Prerequisites and co-requisites:

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

Recommended optional programme components:

-

Recommended or required reading:

Reading package at course wiki-pages.

Assessment methods and criteria:

Exam.

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

Grading:

1-5 / Fail.

Person responsible:

Doc. Seppo Rytönen and Doc. Kari Koivula.

Working life cooperation:

No.

Other information:

-

76667S: Modern characterization methods in material science, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opettajat: Wei Cao

Opintokohteen kielet: English, Finnish

ECTS Credits:

5 ECTS cr

Language of instruction:

English

Timing:

Not lectured every year

Learning outcomes:

This course is aiming to give an overview of advances in materials characterization methods. Through the course, students are expected to master basic characterization methods, and correlate observed phenomena to materials properties. Techniques are dedicated to determinations of morphologies and electronic structures of bulk, nano-films as well as free and deposited clusters.

Contents:

The course will be focused on methods and special requirements on experimental researches in the field of materials science. The lessons and demonstration include principles related to conventional characterization methods, microscopic detections, and the latest synchrotron-radiation-based techniques. Students will be guided to practice laboratory works of the vapor deposit sample growth system, morphological, and electronic structure measurements through SEM and the XPS. The course will also cover introduction to inorganic material growth methods, requirements to select different techniques, and physical insights within materials functionalities.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 24 h, exercises 10 h, 2 laboratory exercises, self-study 118 h

Target group:

Primarily for the students of the master program degree in physics. Also for the other students of the University of Oulu.

Prerequisites and co-requisites:

No specific prerequisites

Recommended optional programme components:

No alternative course units or course units that should be completed simultaneously

Recommended or required reading:

Material Characterization techniques, by Sam Zhang, Lin Li, and Ashok Kumar, CRC press (2009); X-ray characterization of materials edited by Eric Lifshin, Wiley-VCH, (1999).

Assessment methods and criteria:

One written examination.

Read more about assessment criteria at the University of Oulu webpage.

Grading:

Numerical grading scale 0 – 5, where 0 = fail

Person responsible:

Wei Cao

Working life cooperation:

No work placement period

Other information:

[Course website](#)

801631S: Modern real analysis, 5 op

Voimassaolo: 01.01.2018 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opettajat: Meng Wu

Opintokohteen kielet: English

ECTS Credits:

5 credits

Learning outcomes:

Description of the course 10 credits: On successful completion of this course, the student will be able to - derive and prove basic results of modern real analysis. - apply the results and methods of modern real analysis in different topics of mathematics, like in Geometric Measure Theory, Fractal Geometry, ...

Contents:

Description of the course 10 credits: The course presents Lebesgue spaces (Hölder's and Minkowski's inequalities, completeness, dual spaces), the Vitali covering theorem, the Hardy-Littlewood maximal function, Lebesgue's density theorem, ...

Person responsible:

Meng Wu

757311A: Molecular methods I, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Lumi Viljakainen

Opintokohteen kielet: Finnish

Leikkaavuudet:

750364A Molecular methods I 4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

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

Learning outcomes:

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

Contents:

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

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

48 h exercises including demonstrations, 50 h independent work including homework and writing reports.

Target group:

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

Prerequisites and co-requisites:

Concepts of genetics (757110P) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Reports.

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

Grading:

Pass / Fail

Person responsible:

Doc. Lumi Viljakainen.

Working life cooperation:

No.

Other information:

-

761620S: Molecular properties, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opettajat: Vaara, Juha Tapani

Opintokohteen kielet: Finnish, English

ECTS Credits:

5 ECTS credits / 133 hours of work

Language of instruction:

English

Timing:

Every second year (odd year), spring.

Learning outcomes:

After passing the course, the students understand the basic quantum-mechanical principles behind both experimental spectroscopic and computational (electronic-structure) means of investigating the structure and properties of molecules in the gas phase, in solution and in the solid state.

Contents:

Molecular rotations and vibrations, electronic transitions, electric, optical, and magnetic properties of molecules.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 30 h, demonstrations 14 h, two computer-based homework exercises, self-study 109 h

Target group:

Advanced undergraduate and beginning graduate students of physics, chemistry and materials sciences. Also for the other students of the University of Oulu.

Prerequisites and co-requisites:

Necessary background: Intermediate courses in atomic and thermal physics, 761679S Molecular quantum mechanics or the corresponding knowledge.

Recommended optional programme components:

No alternative course units or course units that should be completed simultaneously

Recommended or required reading:

P.W. Atkins and R.S. Friedman, "Molecular Quantum Mechanics", 5th edition, Chapters 10 - 13, Oxford University Press, 2011.

Lecture notes.

Assessment methods and criteria:

Final examination.

Read more about assessment criteria at the University of Oulu webpage.

Grading:

Numerical grading scale 0 - 5, where 0 = fail

Person responsible:

Juha Vaara

Working life cooperation:

No work placement period

Other information:

<https://wiki oulu.fi/display/766660S>

766666S: NMR spectroscopy , 10 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opettajat: Ville-Veikko Telkki

Opintokohteen kielet: English, Finnish

ECTS Credits:

10 ECTS cr

Language of instruction:

English

Timing:

Every second year (even year), autumn

Learning outcomes:

After completion, student understands the physical basis of NMR phenomenon and realizes the potential of NMR spectroscopy in the studies of molecular and materials properties.

Contents:

NMR (Nuclear Magnetic Resonance) spectroscopy is a versatile tool for studying the physical properties of all states of matter. It makes possible, for example, the determination of molecular structures, even those of biological macromolecules, other molecular properties and the study of their dynamics. The most well-known application of NMR phenomenon is magnetic resonance imaging (MRI).

During the course, students get familiar with the basics of NMR spectroscopy, the interactions affecting the structure of NMR spectra and the principles of a spectrometer. Modern NMR allows the manipulation of nuclear spins applying various pulse sequences, and pulse sequences related to, e.g., polarization transfer will be treated as well as the basics of multidimensional NMR.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 52 h, exercises and demonstrations 24 h, self-study 190 h

Target group:

Primarily for the students of the degree programme in physics and chemistry. Also for the other students of the University of Oulu.

Prerequisites and co-requisites:

Basic knowledge on quantum mechanics and atomic physics helps but is not compulsory.

Recommended optional programme components:

Ei vaihtoehtoisia tai samanaikaisesti suoritettavia opintojaksoja

Recommended or required reading:

Material will be distributed during the course. The course is mainly based on the following book: J. Keeler, *Understanding NMR Spectroscopy* (John Wiley & Sons, Chichester, 2010).

Assessment methods and criteria:

One written examination.

Read more about assessment criteria at the University of Oulu webpage.

Grading:

Numerical grading scale 0 – 5, where 0 = fail

Person responsible:

Ville-Veikko Telkki

Working life cooperation:

Ei sisällä työharjoittelua

Other information:

[Course page](#)

767303S: Observational Astronomy I, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opettajat: Vitaly Neustroev

Opintokohteen kielet: English

Ei opintojaksokuvauksia.

767300A: Observational astronomy II, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opettajat: Vitaly Neustroev

Opintokohteen kielet: English, Finnish

Leikkaavuudet:

767600S Observational astronomy II 5.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work

Learning outcomes:

This is a follow up course to 767303A/767603S, designed to give additional practice utilizing the skills learned in Part I. Students must have taken Part I of the series prior to enrolling in this class.

Contents:

A more detailed and practical course (part two) which covers the theory and practice of obtaining meaningful astronomical data. Topics covered include different detector/telescope configurations, the atmosphere and its effects on observation, observational experiments, calibrations and data reductions, both on a theoretical level and experimentally with the real data. It also introduces some analysis tools and statistical techniques (signal detection, signal-to-noise estimates, model fitting, and goodness-of-fit estimation, etc.) that are commonly used in astronomical research.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 12 h, exercises 24 h, self-study 97 h

Target group:

Primarily for the students of the degree programme in physics. Also for the other students of the University of Oulu.

Prerequisites and co-requisites:

Observational astronomy Part I (767303A /767603S)

Recommended optional programme components:

No alternative course units or course units that should be completed simultaneously

Recommended or required reading:

Recommended reading: Kitchin, C.R.: Astrophysical Techniques. Romanishin, W.: An Introduction to Astronomical Photometry Using CCDs - <http://observatory.ou.edu/wrccd22oct06.pdf> Birney, D. S., Gonzalez, G. & Oesper, D.: Observational Astronomy (2nd Edition - 2006) Course material availability can be checked here

Assessment methods and criteria:

One written examination Lue lisää opintosuoritusten arvostelusta yliopiston verkkosivulta.

Grading:

Numerical grading scale 0 – 5, where 0 = fail

Person responsible:

Vitaly Neustroev

Working life cooperation:

No work placement period.

767600S: Observational astronomy II, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opettajat: Vitaly Neustroev

Opintokohteen kielet: English, Finnish

Leikkaavuudet:

767300A Observational astronomy II 5.0 op

ECTS Credits:

5 ECTS credits /133 hours of work

Learning outcomes:

This is a follow up course to 767303A/767603S, designed to give additional practice utilizing the skills learned in Part I. Students must have taken Part I of the series prior to enrolling in this class.

Contents:

A more detailed and practical course (part two) which covers the theory and practice of obtaining meaningful astronomical data. Topics covered include different detector/telescope configurations, the atmosphere and its effects on observation, observational experiments, calibrations and data reductions, both on a theoretical level and experimentally with the real data. It also introduces some analysis tools and statistical techniques (signal detection, signal-to-noise estimates, model fitting, and goodness-of-fit estimation, etc.) that are commonly used in astronomical research.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 12 h, exercises 24 h, self-study 97 h

Target group:

Primarily for the students of the degree programme in physics. Also for the other students of the University of Oulu.

Prerequisites and co-requisites:

Observational astronomy Part I (767303A/767603S)

Recommended optional programme components:

No alternative course units or course units that should be completed simultaneously

Recommended or required reading:

Recommended reading: Kitchin, C.R.: Astrophysical Techniques. Romanishin, W.: An Introduction to Astronomical Photometry Using CCDs - <http://observatory.ou.edu/wrccd22oct06.pdf> Birney, D. S., Gonzalez, G. & Oesper, D.: Observational Astronomy (2nd Edition - 2006) Course material availability can be checked here

Assessment methods and criteria:

One written examination Lue lisää opintosuoritusten arvostelusta yliopiston verkkosivulta.

Grading:

Numerical grading scale 0 – 5, where 0 = fail

Person responsible:

Vitaly Neustroev

Working life cooperation:

No work placement period

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

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Taulavuori

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

2-6 ECTS credits / 53-160 hours of work. About 100 pages / 1 ECTS credit.

Language of instruction:

Most books are in English.

Timing:

B.Sc. or M.Sc. degree.

Learning outcomes:

To understand environmental protection in global context.

Contents:

Depends on the book.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Three times per both semesters in university exam days. Exam days are announced in WebOodi.

Target group:

Biology, geography, geology, environmental engineering , exchange students.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Gaston & Spicer (2004) Biodiversity – an introduction. Blackwell Publishing, 191p; Lockwood et al. (2007) Invasion Ecology, Blackwell Publishing, 304 p; ACIA (2005) Arctic Climate Impact Assessment, Cambridge University Press, 1042 p.; Dincer et al. (2013) Causes, Impacts and Solutions to Global Warming, Springer, 1183 p.

Assessment methods and criteria:

Exam.

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

Grading:

1-5 / Fail.

Person responsible:

Doc. Kari Taulavuori.

Working life cooperation:

No.

Other information:

Student has to consult about the selected literature before exam.

791635A: Physical Geography of Fennoscandia, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Geography

Arvostelu: 1 - 5, pass, fail

Opettajat: Janne Alahuhta

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay791635A Physical Geography of Fennoscandia (OPEN UNI) 5.0 op

ECTS Credits:

5 ECTS

Language of instruction:

Finnish and English

Timing:

2nd or 3rd year, 1st or 2nd semester.

Learning outcomes:

Course familiarizes students to the geography of the Fennoscandia. When the student has passed the written exam, he/she can define the special characters of the physical geography of Fennoscandia

Contents:

Physical geography of the Fennoscandia.

Mode of delivery:

Book exam.

Learning activities and teaching methods:

Book exam.

Target group:

Obligatory for teachers, others voluntary.

Prerequisites and co-requisites:

-

Recommended optional programme components:
 Course is part of minor studies of Geography.

Recommended or required reading:

- Seppälä, Matti (ed.) (2005). Physical Geography of Fennoscandia, 1st ed. 432 p. Oxford University Press.

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

Grading:
 1–5.

Person responsible:
 Janne Alahuhta

Working life cooperation:
 No.

767302A: Physics of the solar system II, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opettajat: Jürgen Schmidt

Opintokohteen kielet: English, Finnish

Leikkaavuudet:

767602S Physics of the solar system II 5.0 op

ECTS Credits:

5 ECTS cr

Language of instruction:

English

Timing:

Not lectured every year

Learning outcomes:

The student learns concepts and methods of solar system science and their application to current problems in the field.

Contents:

In extension of Physics of the Solar System I, this course addresses in greater depth special topics like planetary magnetospheres, tidal interaction, planetary interiors, and the origin and evolution of the Solar System.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

26 hours lecture, 26 hours exercises, 135 hours self-study

Target group:

Primarily for the students of the degree programme in physics. Also for the other students of the University of Oulu. The course can be taken at an intermediate and at an advanced level.

Prerequisites and co-requisites:

No specific prerequisites

Recommended optional programme components:

No alternative course units or course units that should be completed simultaneously

Recommended or required reading:

'Planetary Sciences', I. de Pater, J.J. Lissauer (Cambridge University Press), 'Physics of the Solar System', B. Bertotti, P. Farinella, D. Vokrouhlicky (Kluwer Academic Publishers), 'Solar System Dynamics', C.D. Murray, S.F. Dermott (Cambridge University Press) Course material availability can be checked here.

Assessment methods and criteria:

One written examination and points from worked exercise problems Read more about assessment criteria at the University of Oulu webpage.

Grading:

Numerical grading scale 0 – 5, where
0 = fail

Person responsible:

Jürgen Schmidt

Working life cooperation:

Nowork placement period

767602S: Physics of the solar system II, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opettajat: Jürgen Schmidt

Opintokohteen kielet: Finnish, English

Leikkaavuudet:

767302A Physics of the solar system II 5.0 op

ECTS Credits:

5 ECTS cr

Language of instruction:

English

Timing:

Not lectured every year

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Face-to-face teaching

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Target group:

Primarily for the students of the degree programme in physics. Also for the other students of the University of Oulu. The course can be taken at an intermediate and at an advanced level.

Prerequisites and co-requisites:

No specific prerequisites

Recommended optional programme components:

No alternative course units or course units that should be completed simultaneously

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Assessment methods and criteria:

One written examination and points from worked exercise problems Read more about assessment criteria at the University of Oulu webpage.

Grading:

Numerical grading scale 0 – 5, where 0 = fail

Person responsible:

Jürgen Schmidt

Working life cooperation:

No work placement period

756344A: Plant ecology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Annamari Markkola, Kari Taulavuori

Opintokohteen kielet: Finnish

Leikkaavuudet:

752300A Plant ecology 7.0 op

ECTS Credits:

5 cr / 133 hours of work.

Language of instruction:

Lectures Finnish, Exercises Finnish / English.

Timing:

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

Learning outcomes:

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

Contents:

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

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

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

Target group:

Compulsory to ECO.

Prerequisites and co-requisites:

Basics of ecology (750124P) and Plant ecology field course (756343A) or equivalent knowledge.

Recommended optional programme components:

-

Recommended or required reading:

Ridge, I. 2002: Plants, Oxford Univ. Press..

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

Assessment methods and criteria:

Lecture Book exam (final grade), laboratory diary and seminar presentation (both accepted/rejected).

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

Grading:

1-5 / Fail.

Person responsible:

Doc. Kari Taulavuori.

Working life cooperation:

No.

Other information:

-

756343A: Plant ecology field course, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Annamari Markkola

Opintokohteen kielet: Finnish

Leikkaavuudet:

752304A Field course in ecological botany 5.0 op

ECTS Credits:

5 cr / 133 h of work.

Language of instruction:

Finnish / English.

Timing:

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

Learning outcomes:

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

Contents:

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

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

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

Target group:

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

Prerequisites and co-requisites:

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

Recommended optional programme components:

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

Recommended or required reading:

Laitinen et al. 2012: Field course in ecological botany; Hanhela, P. & Halonen, P. 1995: Plant identification; Huttunen, A. 1995: Introduction to forest types; Euroala, S., Hicks, S. and Kaakinen, H. 1994: Key to Finnish mire types, pp. 12-117 in: Moore, P. D. (ed.), 1994 European mires, London Academic Press, London, 367 p. The availability of the literature can be checked from [this link](#).

Assessment methods and criteria:

Field exams, report.

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

Grading:

1-5 / Fail.

Person responsible:

doc. Annamari Markkola.

Working life cooperation:

Essential working life skills are learned during the field course.

Other information:

-

791621S: Political geography, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Geography

Arvostelu: 1 - 5, pass, fail

Opettajat: Paasi Anssi

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS

Language of instruction:

English and/or Finnish.

Timing:

1st MSc-year, 2nd semester.

Learning outcomes:

A student will reach competence in the basics of today's political geography. He/she will understand the processes of territorialism also from the theoretical point of view.

Contents:

Introduction to political geography, its themes and traditions, with empirical cases and theoretical insights. The main focus is on territorialism, borders (e.g. the institutionalization of the Finnish territory), intercultural confrontations and otherness.

Mode of delivery:

Face-to-face learning.

Learning activities and teaching methods:

14 hrs lectures and a book exam.

Target group:

Students in Human and Cultural Geography.

Prerequisites and co-requisites:

-

Recommended optional programme components:

-

Recommended or required reading:

To be announced in the first lecture.

Assessment methods and criteria:

Exam on exam day.

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

Grading:

1-5.

Person responsible:

Anssi Paasi

Working life cooperation:

No.

Other information:

The course is organized in every other year. Next time on spring semester 2019.

791621S-02: Political geography, book, 0 op

Voimassaolo: - 31.07.2019

Opiskelumuoto: Advanced Studies

Laji: Partial credit

Vastuuyksikkö: Field of Geography

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

791621S-01: Political geography, lectures, 0 op

Voimassaolo: - 31.07.2019

Opiskelumuoto: Advanced Studies

Laji: Partial credit

Vastuuyksikkö: Field of Geography

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

791613S: Position based analyses and services in geography, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Geography

Arvostelu: 1 - 5, pass, fail

Opettajat: Ossi Kotavaara

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

5 ECTS

Language of instruction:

Finnish and also English at need

Timing:

1st or 2nd MSc-year, 2nd semester.

Learning outcomes:

The objective is that the student understands basics of GPS positioning, can use GPS devices, can collect location based data by GPS and positioning in research.

Contents:

Basics of GPS and hand held devices, collecting location based geographical information by GPS, GPS data transformations with GIS, research by using GPS data. Location based services (LBS).

Mode of delivery:

Face-to-face learning.

Learning activities and teaching methods:

20 h lectures, reading circle, exercises, demonstrations and field working. Integrating GPS and LBS data with GIS and research in theory and practice. Written report and seminar.

Target group:

Especially students of GIS.

Prerequisites and co-requisites:

GIS basics and cartography and Advanced course of GIS have to be done.

Recommended or required reading:

NOPPA Study Portal

Assessment methods and criteria:

Written report and seminar.

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

Grading:

1–5

Person responsible:

Jarmo Rusanen, Ossi Kotavaara

Working life cooperation:

No.

791619S: Pro gradu thesis (Master Thesis), 30 op

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Field of Geography

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish**ECTS Credits:**

30 ECTS

Language of instruction:

Finnish, Swedish, English or other possible language which is agreed with professors.

Timing:

(1st or) 2nd year, 1st or 2nd semesters (autumn or spring semesters)

Learning outcomes:

Indicates that the student is able to carry out demanding and independent academic research work. Thesis shows that the student can write a Thesis which are based on material that he/she has studied and on basic concepts and phenomena of his/her field of specialization. In the Thesis the student can use the most central research methods, and can classify, analyse and evaluate his/her knowledge in relation to the tradition of the research field. The Thesis shows that the student can make accurate conclusions about the studied phenomena and he/she reflects those in relation to research tradition. Thesis is based on latest aspects of the field and also develops new research subjects and questions.

Contents:

The Thesis will deal with the subject that is approved by professor or other supervisor. The student will take part to Seminar (I, II, III) in Master Thesis (791631S).

Mode of delivery:

Face-to-face learning.

Learning activities and teaching methods:

Independent research report.

Target group:

Common course to all students of Geography.

Prerequisites and co-requisites:

Recommendation: all the Basic and Intermediate studies are finished and main part of Advanced studies are finished.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Written Thesis.

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

Grading:

The Thesis will approved and grades the Departmental Council of the Department of Geography, 1–5.

Person responsible:

Professors.

Working life cooperation:

Yes. Master thesis can be carried out in wider research or development project.

Other information:

-

800683S: Project in mathematics, 10 op**Voimassaolo:** 01.08.2017 -**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Field of Mathematics**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Esa Järvenpää**Opintokohteen kielet:** Finnish, English**ECTS Credits:**

10 ECTS credits / 266 hours of work

Language of instruction:

Finnish or English

Timing:

4th or 5th year

Learning outcomes:

After passing the course the student is able to do a small mathematical discourse based on literature.

Contents:

The course starts with presentations of mathematics research groups. Students are divided into research groups and they make a small thesis under the supervision of a research group. The thesis is presented in a talk to other students.

Mode of delivery:

Face-to-face teaching and independent work.

Learning activities and teaching methods:

Seminars and own work

Target group:

Major's in pure mathematics

Prerequisites and co-requisites:

Bachelor's degree in mathematics

Recommended optional programme components:

Independent course

Recommended or required reading:

-

Assessment methods and criteria:

Discourse and talk

Grading:

Pass/Fail

Person responsible:

Esa Järvenpää

Working life cooperation:

-

763312A: Quantum mechanics I, 10 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

763612S Quantum mechanics I 10.0 op

ECTS Credits:

10 ECTS cr

Language of instruction:

Finnish / English depending on the audience

Timing:

3rd autumn

Learning outcomes:

The most important goal of the course is the development of a quantum mechanical frame-of-mind. After the course, the student knows the postulates of quantum mechanics and can solve the Schrödinger equation in such one- and three-dimensional problems that have important applications in condensed matter physics and in atomic, nuclear and molecular physics. The student will also learn to derive the uncertainty principle and use it to interpret what happens in a quantum mechanical measurement.

Contents:

Quantum mechanics, together with the general theory of relativity, lays the foundation for the modern scientific understanding of the nature. Recent developments in nanotechnology has also brought quantum-based applications into our everyday lives. However, the greatest influence quantum mechanics brings is on how we understand and interpret the behavior of the basic building blocks of nature. One of the interesting results of quantum mechanics is the uncertainty principle which means, for example, that a particle does not possess well defined position and velocity at a given time. This has far-reaching consequences in our understanding of the structure of matter, and even of the present amount and distribution of galaxies in the known universe. The inherent indeterminacy in the classical state of the particles implies that the microscopic particles have to be described with the so-called wave function, which determines the probability density of finding the particle at an arbitrary location. The course begins with the introduction of the basic principles and postulates of quantum mechanics. As an example, several one-dimensional problems for the time-evolution of the wave function are

solved. The uncertainty principle is derived in its general form, and applied to the simultaneous measurement of position and velocity. In three-dimensional problems, spherical symmetry is connected with the angular momentum. The corresponding operators and quantum numbers are derived. As an example, the quantized energy states of hydrogen atom are solved. The general formulation of quantum mechanics in terms of abstract Hilbert space and its linear transformations is presented, and shown to be equivalent with the wave function formalism. The properties of the general theory are illustrated in terms of the two quantum paradigms: the two-level system and the harmonic oscillator.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 50 h, 12 exercises (á 3 h), self-study and examination 184 h

Target group:

Compulsory for theoretical physicists and physicists. Also for the other students of the University of Oulu.

Prerequisites and co-requisites:

Atomic physics (766326A) and knowledge of linear algebra and differential equations.

Recommended optional programme components:

No alternative course units or course units that should be completed simultaneously.

Recommended or required reading:

J. Tuorila: Kvanttimekaniikka I (2013, in Finnish). D. Griffiths: Introduction to Quantum Mechanics (2005).

Course material availability can be checked [here](#).

Assessment methods and criteria:

Two written intermediate examinations or one final examination.

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

Grading:

Numerical grading scale 0 – 5, where 0 = fail

Person responsible:

Matti Alatalo

Working life cooperation:

No work placement period

Other information:

[Course website](#)

763612S: Quantum mechanics I, 10 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

763312A Quantum mechanics I 10.0 op

ECTS Credits:

10 ECTS cr

Language of instruction:

Finnish / English depending on the audience

Timing:

3rd autumn

Learning outcomes:

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defined position and velocity at a given time. This has far-reaching consequences in our understanding of the structure of matter, and even of the present amount and distribution of galaxies in the known universe. The inherent indeterminacy in the classical state of the particles implies that the microscopic particles have to be described with the so-called wave function, which determines the probability density of finding the particle at an arbitrary location. The course begins with the introduction of the basic principles and postulates of quantum mechanics. As an example, several one-dimensional problems for the time-evolution of the wave function are solved. The uncertainty principle is derived in its general form, and applied to the simultaneous measurement of position and velocity. In three-dimensional problems, spherical symmetry is connected with the angular momentum. The corresponding operators and quantum numbers are derived. As an example, the quantized energy states of hydrogen atom are solved. The general formulation of quantum mechanics in terms of abstract Hilbert space and its linear transformations is presented, and shown to be equivalent with the wave function formalism. The properties of the general theory are illustrated in terms of the two quantum paradigms: the two-level system and the harmonic oscillator.

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J. Tuorila: Kvanttimekaniikka I (2013, in Finnish). D. Griffiths: Introduction to Quantum Mechanics (2005).

Assessment methods and criteria:

Two written intermediate examinations or one final examination.

Read more about assessment criteria at the University of Oulu webpage.

Grading:

Numerical grading scale 0 – 5, where 0 = fail

Person responsible:

Matti Alatalo

Working life cooperation:

No work placement period

Other information:

[Course website](#)

763613S: Quantum mechanics II, 10 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

763313A Quantum mechanics II 10.0 op

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

10 ECTS cr

Language of instruction:

English (or Finnish, depending on the participants)

Timing:

3rd spring

Learning outcomes:

Course continues the development of the quantum mechanical frame-of-mind. After the course, the student can solve different physical eigenvalue problems by using matrices, can calculate the quantum numbers of the system, and can estimate the effect of a perturbation. The student can also solve problems that arise in low-energy scattering.

Contents:

Quantum mechanics of two and many particle systems is discussed in the context of, e.g. the periodic table of elements and the band structure of solids. For atomic, molecular and nuclear physics, the essential quantity in classifying states is the angular momentum, which we study in detail including the particle spin. Effects of weak perturbations are studied in terms of time-independent and time-dependent perturbation theory. As an example, we calculate fine-structure corrections to hydrogen atom, Zeeman effect, and the bound states of ionic Hydrogen molecule and He-atom. We derive the Fermi golden rule to calculate radiation induced transition rates between eigenstates. Finally we study interactions between particles using scattering theory. Concepts such as cross section, phase shift, scattering amplitude and Green's function are introduced.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 50 h, 12 exercises, self-study and examination 184 h

Target group:

For all interested in modern, quantum phenomena, compulsory for theoretical physicists. Also for the other students of the University of Oulu.

Prerequisites and co-requisites:

Quantum Mechanics I (763312A).

Recommended optional programme components:

No alternative course units or course units that should be completed simultaneously.

Recommended or required reading:

J. Tuorila: Kvanttimekaniikka II (2014, in Finnish). D. Griffiths: Introduction to Quantum Mechanics (2005).

Assessment methods and criteria:

Two written intermediate examinations or one final examination.

Read more about assessment criteria at the University of Oulu webpage.

Grading:

Numerical grading scale 0 – 5, where 0 = fail

Person responsible:

Matti Alatalo

Working life cooperation:

No work placement period

Other information:

[Course website](#)

763313A: Quantum mechanics II, 10 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

763613S Quantum mechanics II 10.0 op

ECTS Credits:

10 ECTS cr

Language of instruction:

English (or Finnish, depending on the participants)

Timing:

3rd spring

Learning outcomes:

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eigenstates. Finally we study interactions between particles using scattering theory. Concepts such as cross section, phase shift, scattering amplitude and Green's function are introduced.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 50 h, 12 exercises, self-study and examination 184 h

Target group:

For all interested in modern, quantum phenomena, compulsory for theoretical physicists. Also for the other students of the University of Oulu.

Prerequisites and co-requisites:

Quantum Mechanics I (763312A).

Recommended optional programme components:

No alternative course units or course units that should be completed simultaneously

Recommended or required reading:

J. Tuorila: Kvanttimekaniikka II (2014, in Finnish). D. Griffiths: Introduction to Quantum Mechanics (2005).

Course material availability can be checked [here](#).

Assessment methods and criteria:

Two written intermediate examinations or one final examination.

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

Grading:

Numerical grading scale 0 – 5, where 0 = fail

Person responsible:

Matti Alatalo

Working life cooperation:

No work placement period

Other information:

[Course website](#)

766657S: Radio waves in the ionosphere, 8 op

Voimassaolo: 01.01.2018 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opettajat: Anita Aikio

Opintokohteen kielet: Finnish, English

ECTS Credits:

8 ECTS cr

Language of instruction:

English or Finnish (depending on participants)

Timing:

Lectured every 2-3 year

Learning outcomes:

After passing the course, the student knows the ionospheric regions and can study theoretically how radio waves propagate in the ionosphere. The student can also describe how the scientific radio-wave-based instruments, like ionosonde, riometer and incoherent scatter radar, work and utilise the knowledge in space physics research.

Contents:

The Earth's ionosphere and its properties, basic theory for radio waves, radio wave propagation in the ionosphere, scientific principle and obtained scientific parameters for the following instruments: ionosonde (plasma density), riometer (D region absorption) and incoherent scatter radar (plasma density, temperatures, velocity).

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

40 h lectures, 16 h exercises, 157 h independent studying

Target group:

Primarily for the students of the degree programme in physics, specifically space physics students. Also for the other students of the University of Oulu that are interested in the topic.

Assessment methods and criteria:

Final examination.

Read more about assessment criteria at the University of Oulu webpage.

Person responsible:

Anita Aikio

790106A: Region, culture and society, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Geography

Arvostelu: 1 - 5, pass, fail

Opettajat: Paasi Anssi

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS

Language of instruction:

English and Finnish

Timing:

2nd year, 1st semester.

Learning outcomes:

A student can explain and represent the main ideas of regional geography, theoretical and practical meanings of concept 'region' and the role of region in order to manage society and culture.

Contents:

Development of (contemporary) regional geography, theoretical meanings of concept 'region', region and power. Lecture serves different fields of specialization.

Mode of delivery:

Face-to-face learning.

Learning activities and teaching methods:

16 h lectures and an exam (lectures and literature)

Target group:

Common course to all students of Geography.

Prerequisites and co-requisites:

-

Recommended optional programme components:

Course is part of minor studies of Geography.

Recommended or required reading:

Material will be delivered during the course.

Assessment methods and criteria:

Exam on exam day.

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

Grading:

1–5.

Person responsible:

Anssi Paasi.

Working life cooperation:

No.

792319A: Regional politics, policy and development: Northern Europe, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Geography

Arvostelu: 1 - 5, pass, fail

Opettajat: Heikki Sirviö

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS

Language of instruction:

Finnish and English. English speaking students should contact the teacher before the course.

Timing:

2nd year, 1st semester

Learning outcomes:

Upon completion of the course the student will be able to:

- analyse and classify basic theories, concepts and models of regional development and policy,
- apply theories, concepts and models in interpretation, recognize their use in scientific papers and discuss them,
- perceive the characteristics and challenges in the regional development and policy in Northern Europe.

Contents:

Students familiarize themselves with the basic theories, concepts, and models of regional development and policy, and their application in practical challenges and decision-making by reading and analysing scientific articles.

Mode of delivery:

Face-to-face teaching, independent work.

Learning activities and teaching methods:

The course involves 14 h of reading group sessions and 118 h of self-learning by reading the assigned articles, writing memos and preparing an essay.

Target group:

Students who take the Regional development and policy module.

Prerequisites and co-requisites:

-

Recommended optional programme components:

The course does not require additional studies carried out at the same time.

Course is part of minor studies of regional development and regional policy.

Recommended or required reading:

Reading list will be available by the beginning of the course.

Assessment methods and criteria:

The assessment criteria are based on the learning outcomes of the course.

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

Grading:

1–5.

Person responsible:

Heikki Sirviö

Working life cooperation:

No.

791636S: Remote sensing in Physical Geography, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Geography

Arvostelu: 1 - 5, pass, fail

Opettajat: Jan Hjort

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS

Language of instruction:

Only in Finnish.

Timing:

1st or 2nd MSc-year, 1st semester.

Learning outcomes:

Student can use remote sensing techniques when he/she is compiling research data, analysing earth surface feature and solving research problems.

Contents:

Course gives an overview of remote sensing in physical geography.

Mode of delivery:

Face-to-face learning.

Learning activities and teaching methods:

Lectures, reading circle, practicals and final report.

Target group:

Students of Physical Geography.

Prerequisites and co-requisites:

Advanced course in GIS have to be done.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Participation in reading circle and practicals and written report.

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

Grading:

1-5.

Person responsible:

Jan Hjort and Olli Karjalainen

Working life cooperation:

No.

765307A: Research Project of Astronomy I, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opettajat: Heikki Salo

Opintokohteen kielet: Finnish

Leikkaavuudet:

765332A	Study project in astronomy 1	5.0 op
765332A-01	Data processing in astronomy	0.0 op
765332A-02	Study project	0.0 op
765135P	Data processing in astronomy	2.0 op

ECTS Credits:

5 ECTS credits /133 hours of work

Language of instruction:

Finnish or English

Timing:

2 nd Spring

Learning outcomes:

Student is able to use computer in processing and visualizing astronomical data.

Contents:

Student is able to use computer in processing and visualizing astronomical data.

Mode of delivery:

Face-to-face teaching, independent study

Learning activities and teaching methods:

Lectures 21 h and study project, self-study 115 h

Target group:

Students in astronomy

Prerequisites and co-requisites:

No

Recommended optional programme components:

No alternative course units or course units that should be completed simultaneously

Recommended or required reading:

Lecture material

Assessment methods and criteria:

Quality of the project report

Grading:

Numerical grading scale 0 – 5, where 0 = fail

Person responsible:

Heikki Salo, Vitaly Neustroev, Sebastien Comeron, Jürgen Schmidt, Aaron Watkins, Joachim Lanz, Xiaodong Liu

765307A-01: Research Project of Astronomy I: Data processing in astronomy, 0 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

765332A-02	Study project	0.0 op
765332A	Study project in astronomy 1	5.0 op
765332A-01	Data processing in astronomy	0.0 op
765135P	Data processing in astronomy	2.0 op

Ei opintojaksokuvauksia.

765307A-02: Research Project of Astronomy I: Study project, 0 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

765332A-01	Data processing in astronomy	0.0 op
765332A-02	Study project	0.0 op
765332A	Study project in astronomy 1	5.0 op

Ei opintojaksokuvauksia.

750613S: Research training, 2 - 15 op

Opiskelumuoto: Advanced Studies

Laji: Practical training

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

1-14 ECTS credits / 27-405 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. degree.

Learning outcomes:

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

Contents:

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

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

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

Target group:

-

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Report.

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

Grading:

Pass / Fail.

Person responsible:

Doc. Seppo Rytönen ja Doc. Annamari Markkola (ECO), Prof. Outi Savolainen and Prof. Hely Häggman (BS).

Working life cooperation:

Yes. Participating to biology project gives working life skills.

Other information:

-

755632S: Restoration ecology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Annamari Markkola, Tolvanen, Anne Kristiina

Opintokohteen kielet: Finnish

Leikkaavuudet:

756607S Restoration ecology 2.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. degree.

Learning outcomes:

Lectures: the student understands the ecological principles of restoration and remembers the basics of restoration options in different ecosystems. Exercises and excursion: the student is able to evaluate the need for restoration and possibilities of an ecosystem to regenerate, and apply the restoration techniques in practical restoration planning.

Contents:

Land-use impacts and ecosystem malfunctions caused by humans, ecological principles of restoration, prevention and restoration of manmade damage in the ecosystems. Examples from restoration options and practical techniques in terrestrial and aquatic ecosystems, and cultural landscapes.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

24 h lectures, exercises and an excursion.

Target group:

ECO.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

Andre Clewell, James Aronson 2008: Ecological Restoration, Principles, Values, and Structure of an Emerging Profession, Island Press, 230 p. and articles in the Restoration Ecology journal.

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

Assessment methods and criteria:

-

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

Grading:

1-5 / Fail.

Person responsible:

Prof. Anne Tolvanen.

Working life cooperation:

No.

Other information:

-

791631S: Seminar in master's thesis, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Geography

Arvostelu: 1 - 5, pass, fail

Opettajat: Jan Hjort, Saarinen, Jarkko Juhani, Paasi Anssi

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS

Language of instruction:

Finnish.

Timing:

(1st and) 2nd MSc-year, both semesters.

Learning outcomes:

Along with participating to seminars, the student can compare different view points of research and he/she can adapt his/her own Master thesis for wider picture of Geography. In the seminars, the student takes part to the geographical discussions and he/she can argue the results of his/her study.

Contents:

There are three types of seminars to carry out. Seminar I, which takes place in the beginning of the seminar- of last study year, is based on research questions, hypothesis, data, methods, preliminary structure of thesis etc. In Seminar II, the student will present the structure of the thesis, theoretical background and the guidelines the empirical field work. In Seminar III the final version of the Master Thesis will be presented. Co-student will act as an opponent. Working as an opponent is obligatory at least once per seminarperiod.

Mode of delivery:

Face-to-face learning.

Learning activities and teaching methods:

Seminars.

Target group:

Common course to all students of Geography.

Prerequisites and co-requisites:

-

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Participating to seminars.

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

Grading:

Pass / failed.

Person responsible:

Professors; DD Jarkko Saarinen.

Working life cooperation:

No.

766654S: Solar physics, 8 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

8 credits

Language of instruction:

English

Timing:

Roughly every third year.

Learning outcomes:

After passing the course the student is able to describe in physical terms the structure, history and energy production of the Sun, the solar oscillations and the generation and activity of solar magnetic fields, and is able to apply physical theories and mathematical methods describing the Sun to explain the basic phenomena in the Sun.

Contents:

This is an optional physics course at an advanced level on the structure and dynamics of the Sun. The Sun is the most important source of energy for the Earth. The Sun also makes the most dominant contribution to global climate and the conditions of life on Earth. Therefore solar research is very important. Understanding of the basic features of the Sun already belongs to general education.

Contents briefly: Solar structure and history, solar models, energy production in the Sun, solar neutrinos, solar oscillations and helioseismology, convection layer and differential rotation, solar magnetism and dynamo mechanism, solar atmosphere, solar activity.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 44 h, 10 exercises (20 h), self-study 149 h

Target group:

Primarily for the students of the degree programme in physics. Also for the other students of the University of Oulu.

Prerequisites and co-requisites:

No specific prerequisites

Recommended optional programme components:

No alternative course units or course units that should be completed simultaneously

Recommended or required reading:

M. Stix, The Sun. An Introduction, 2. edition, Springer, 2004. Lecture notes: K. Mursula: Solar Physics.

Course material availability can be checked [here](#).

Assessment methods and criteria:

Final examination

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

Grading:

Numerical grading scale 0 – 5, where 0 = fail

Working life cooperation:

No work placement period

Other information:

<https://wiki oulu.fi/display/766654S/>

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

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

752667S Special topics in plant ecology 2.0 op

751690S Lectures on special topics in zoology 2.0 op

ECTS Credits:

2-5 ECTS credits / 53-133 hours of work.

Language of instruction:

Finnish / English.

Timing:

M.Sc. or Ph.D. degree. Arranged if resources allow

Learning outcomes:

Students will be acquainted to current issues in biology.

Contents:

Seminars on current issues in biology.

Mode of delivery:

Varying.

Learning activities and teaching methods:

Varying.

Target group:

Biology students.

Prerequisites and co-requisites:

Varying.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Varying.

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

Grading:

1-5 / Fail or Pass / Fail.

Person responsible:

Prof. Timo Muotka, Prof. Jari Oksanen, Prof. Outi Savolainen and Prof. Hely Häggman.

Working life cooperation:

No.

Other information:

-

790605S: Special research course in Physical Geography, 5 op

Voimassaolo: 01.01.2017 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Geography

Arvostelu: 1 - 5, pass, fail

Opettajat: Jan Hjort

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS

Language of instruction:

Finnish or English.

Timing:

1st or 2nd MSc-year, 1st or 2nd semester.

Learning outcomes:

The student will deepen and develop his/her knowledge in physical geography through literature or through empirical study. More exact learning outcomes is based on method of implementation of the course (agreed with professor).

Contents:

This course serves the specialization of the student. After the course, the student has deepened his/her knowledge and experience in physical geography.

Mode of delivery:

Face-to-face learning, essay or independent studying.

Learning activities and teaching methods:

This course may be performed by different ways. The student can carry out a course from other module, work as research assistant, write an essay, complete a virtual course related to his/her field or make a manuscript based on his/her Master Thesis. Way of performance is discussed with professor.

Target group:

MSc-students, especially in physical geography

Recommended or required reading:

Will be agreed with professor.

Assessment methods and criteria:

Will be agreed with professor. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass/fail

Person responsible:

Jan Hjort

Working life cooperation:

Yes. Working in research or development projects gives working life experience.

765626S: Stellar structure and evolution, 10 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opettajat: Sébastien Comerón Limbourg

Opintokohteen kielet: English, Finnish

Leikkaavuudet:

765311A Stellar structure and evolution 10.0 op

ECTS Credits:

10 ECTS cr

Language of instruction:

English

Timing:

Lectured every 2nd year.

Learning outcomes:

Students understand basic equations that describe the physics of stellar structure and evolution and know how to use them in practice.

Contents:

Stellar equilibrium. Theory of polytropes. Radiation transport. Convection. Nuclear reaction. Stellar evolution. Stellar pulsations. White dwarfs, degenerate gas. Supernovae. Neutron stars and black holes. The course can be also incorporated into advanced studies with some supplementary work.

Mode of delivery:

Face-to-face-teaching

Learning activities and teaching methods:

Lectures 40 h, exercises, self-study 147 h

Target group:

Primarily for the students of the degree programme in physics

Prerequisites and co-requisites:

Fundamentals of astronomy (recommended)

Recommended optional programme components:

No alternative course units or course units that should be completed simultaneously

Recommended or required reading:

D. Prialnik: An introduction to the theory of stellar structure and evolution; R. Bowers, T. Deeming: Astrophysics I. Stars; R. Kippenhahn, A. Weigert: Stellar structure and evolution. Course material availability can be checked here.

Assessment methods and criteria:

One written examination Lue lisää opintosuoritusten arvostelusta yliopiston verkkosivulta

Grading:

Numerical grading scale 0 – 5, where 0 = fail

Person responsible:

Sébastien Comerón

Working life cooperation:

No work placement period

790346A: Substituting written exam (Phy.g), 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Geography

Arvostelu: 1 - 5, pass, fail

Opettajat: Marja Lindholm

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS

Language of instruction:

Finnish and English

Timing:

2nd or 3rd year, 1st or 2nd semester.

Learning outcomes:

The student is able to define and apply the most essential concepts of the discipline from the view point of Physical Geography.

Contents:

The student deepens his/her geographical way of thinking by reading the material of Physical Geography and by writing three applied essays. Thus, the student substitutes the course "Special themes in Physical Geography" (790303A). The topics of the essays are agreed separately with the course supervisor.

Mode of delivery:

The student gets course instructions and agrees the subjects of the essays with the course supervisor.

Learning activities and teaching methods:

Independent work, essays

Target group:

Voluntary, substitutes the course "Special themes in Physical Geography" (790303A).

Prerequisites and co-requisites:

-

Recommended optional programme components:

Substitutes the course "Special themes in Physical Geography" (790303A).

Recommended or required reading:

List of source books is given together with course instructions.

Assessment methods and criteria:

The student writes three applied essays. Read more about assessment criteria at the University of Oulu webpage. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

The course utilizes a numerical grading scale 1-5.

Person responsible:

Marja Lindholm

Working life cooperation:

No.

790610S: Sustainable tourism development in Northern environments, 10 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Geography

Arvostelu: 1 - 5, pass, fail

Opettajat: Kaarina Tervo-Kankare

Opintokohteen kielet: English

ECTS Credits:

10 ects

Language of instruction:

English

Timing:Spring semester, online ([University's online learning platform](#))**Learning outcomes:**

To familiarize students with theory and knowledge related to sustainable tourism development in Northern environments.

In the course students will

1. Gain **knowledge** of the phenomena of northern tourism; the place of sustainable northern tourism within globalization and climate change; and the socio-cultural dimensions of northern tourism.
2. Acquire **skills** that will enable them to critically evaluate why the phenomena of northern tourism should be studied; identify the implications of northern tourism for indigenous cultures; evaluate the implications of northern tourism as related to local communities and resources; and critically examine governance aspects of northern tourism
3. Get the **general competence** of synthesizing academic reading materials read; participating in master's level discussion of course materials; and developing research and writing skills to a Master's level.

Contents:

The course will address tourism in the circumpolar north from a societal perspective. It will present different views on the phenomenon and its dimensions, resources and implications for nature, places and cultures involved. The place of northern tourism in times of globalization and emergent global issues like climate changes will be explored, together with the relevant governance aspects.

Mode of delivery:

Online (University of Oulu's OPTIMA environment)

Learning activities and teaching methods:

Learning will take place in interactive and collaborative forms. It will take place on-line, through such methods as lectures, group discussions, and teamwork. Instructors and students will share discoveries and materials during the course, and use a variety of communication tools.

Prerequisites and co-requisites:

Applicants must have a Bachelor's Degree in tourism, social science, humanities or science, or Bachelor of Business Administration, Bachelor of Arts or Bachelor of Science.

Person responsible:

Kaarina Tervo-Kankare

802642S: Symmetry groups, 5 op

Voimassaolo: 01.01.2018 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opettajat: Pekka Salmi

Opintokohteen kielet: Finnish

ECTS Credits:

5 credits

Language of instruction:

Finnish/English

Learning outcomes:

After completing the course the student is able to

- describe well-known symmetry groups
- determine symmetry groups of geometric objects
- use groups as objects that encode symmetries
- use permutations to represent symmetries
- explain basic concepts associated to group actions
- apply algorithms associated to permutations

Contents:

The notion of group comes from symmetries of different objects such as sets or geometrical objects. In this course we consider groups from this viewpoint. Permutations, i.e. symmetries of sets, give the foundation for these considerations. Then we proceed to study symmetries of more complicated objects such as geometrical ones.

Symmetries are closely related to group actions on different objects. We cover the basic notions associated to group actions such as orbits and stabilisers. One important class of symmetry groups is formed by matrix groups and also those are studied. In addition we consider the relations between all these groups.

Mode of delivery:

Face-to-face teaching, computer exercises (in Finnish)

Learning activities and teaching methods:

28 lectures, 14 h exercises, 91 h independent study

Target group:

Mathematics majors including prospective subject teachers

Prerequisites and co-requisites:

802354A Basics of algebra,

802320A Linear algebra,

802357 Euclidean spaces

Recommended or required reading:

Luewntokalvot, STACK-tehtävät

Assessment methods and criteria:

Final exam, exercises

Grading:

1-5, fail

Person responsible:

Pekka Salmi

790620S: Tourism planning and development, 5 op

Voimassaolo: 01.01.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Geography

Arvostelu: 1 - 5, pass, fail

Opettajat: Kaarina Tervo-Kankare

Opintokohteen kielet: English

ECTS Credits:

5 ECTS

Language of instruction:

English.

Timing:

1st MSc-year, 2nd semester.

Learning outcomes:

After this course, student understands the relationship between tourism planning and regional development and he /she knows the most central models of planning and development in local-global nexus. Student knows the starting points of the tourism policy in different scales, the background aspects of the tourism policy and current trends in regional, national and transnational tourism development and management thinking.

Contents:

Concepts and theories of the tourism development and tourism planning, economic and policy connections and impacts in regional level and basic aspects of the tourism policy and regional tourism strategies.

Mode of delivery:

Face-to-face learning.

Learning activities and teaching methods:

18 hrs lectures, written seminar work and presentation, exam.

Target group:

Students doing the Tourism Geographies Double Degree (DD). Other students based on pre-agreement.

Prerequisites and co-requisites:

-

Recommended optional programme components:

Course is part of the Tourism Geographies Double Degree (DD).

Recommended or required reading:

- Hall, C.M. (2000). Tourism Planning: Policies, Processes and Relationships. 236 s. Prentice Hall, Harlow.
- Fennel, David A. (1999 or later version). Ecotourism – an introduction (partly).
- other material agreed during the course

Assessment methods and criteria:

Participation in practicals, exam on exam day.

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

Grading:

1–5.

Person responsible:

Kaarina Tervo-Kankare

Working life cooperation:

Possibly in some respects.

Other information:

Exam can be written in Finnish. Written seminar work and presentations are in English.

790320A: Tourism planning and development, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Geography

Arvostelu: 1 - 5, pass, fail

Opettajat: Kaarina Tervo-Kankare

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay790320A Tourism planning and development (OPEN UNI) 5.0 op

ECTS Credits:

5 ECTS

Language of instruction:

Finnish and English.

Timing:

3 year, 2nd semester.

Learning outcomes:

After this course, student understands the relationship between tourism planning and regional development and he /she knows the most central models of planning and development in local, regional and national level. He/she knows the starting points of the tourism policy in local and European level, the background aspects of the tourism policy.

Contents:

Concepts and theories of the tourism development and tourism planning, economic impacts in regional level and basic aspects of the tourism policy and regional tourism strategies.

Mode of delivery:

Face-to-face learning.

Learning activities and teaching methods:

16 hrs lectures, written seminar work and presentation, exam.

Target group:

Students who're specialising to Tourism Geography. Course is part of minor studies tourism geography.

Prerequisites and co-requisites:

-

Recommended optional programme components:

Course is part of minor studies tourism geography.

Recommended or required reading:

- Hall, C.M. (2000). Tourism Planning: Policies, Processes and Relationships. 236 s. Prentice Hall, Harlow.
- Fennel, David A. (1999 or later version). Ecotourism – an introduction (partly).

Assessment methods and criteria:

Exam on exam day.

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

Grading:

1–5.

Person responsible:

Kaarina Tervo-Kankare

Working life cooperation:

No.

Other information:

Written exam can be written also in Finnish. Written seminar work and presentation is in English. If needed, this course can be organised as written exam and practical's.

790320A-01: Tourism planning and development, book exam, 0 op

Voimassaolo: - 31.07.2019

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Field of Geography

Arvostelu: 1 - 5, pass, fail

Opettajat: Saarinen, Jarkko Juhani

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

790320A-03: Tourism planning and development, exercises, 0 op

Voimassaolo: - 31.07.2019

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Field of Geography

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

790320A-02: Tourism planning and development, lectures, 0 op

Voimassaolo: - 31.07.2019

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Field of Geography

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

790161A: Tourism, development and sustainability, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Geography

Arvostelu: 1 - 5, pass, fail

Opettajat: Kaarina Tervo-Kankare

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay790161A Tourism, sustainability and environment (OPEN UNI) 4.0 op

ECTS Credits:

5 ECTS

Language of instruction:

English

Timing:

2nd year, 1st semester

Learning outcomes:

After the course, the student understands and can apply the principles of sustainable tourism in different contexts; he/she understands the importance of sustainable development in tourism in different contexts and from different viewpoints (spatial, stakeholder, sector). Student acknowledges the utilization of tourism for diverse development purposes and has basic understanding about its potential pitfalls, especially in the Global South framework. The student can analyse and compare the impacts and meaning of different tourism activities to sustainable development.

Contents:

The course focuses on the idea of sustainable tourism and sustainable development with emphasis on tourism in Global South. The course examines the conceptual and practical dimensions of sustainable tourism, its relationship with sustainable development in general and the applicability and problems associated with it. The course's basic concepts include the following: tourism and sustainable development, sustainable tourism, tourism impacts and sustainability at different scales (local-global) and environments, the roles of different actors (stakeholders) in sustainable tourism, tourism development plans and policies, methods to measure sustainability in tourism and tourism development, the role of sustainable tourist.

These concepts will be discussed both theoretically and in practice, highlighting their relevance in the Global South dimension and utilizing examples in different contexts. Some topical issues relating with the main theme sustainable tourism, such as pro-poor tourism and climate change will be covered in the Global South contexts. In addition, the student chooses one relevant topic to which she/he familiarizes.

Increase knowledge about the role and meaning of tourism in relation to development at different scales, and in different contexts, in the sustainability framework. Sustainability will be examined throughout the tourism system, at different scales and in diverse environments, with central focus on the development issues in the Global South.

Mode of delivery:

Virtual lectures/ppts, reader, short weekly learning diaries, group discussions, and a final assignment, which is also peer-evaluated.

Learning activities and teaching methods:

Lectures, self study, group work, web-based work, essay. To be confirmed at the first lecture.

Target group:

Students of geography who will specialize to Tourism Geography.

Prerequisites and co-requisites:

-

Recommended optional programme components:

Course is part of minor studies tourism geography.

Recommended or required reading:

Scientific articles, textbook chapters, development and other documents. Most of the course material will be provided via the course's Optima-environment.

Assessment methods and criteria:

Evaluation will be based on the learning diaries and the final assignment, which is also evaluated by peers. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

1–5.

Person responsible:

PhD Kaarina Tervo-Kankare

Working life cooperation:

No.

790161A-02: Tourism, sustainability and environment, essay, 0 op

Voimassaolo: - 31.07.2019

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Field of Geography

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

790161A-01: Tourism, sustainability and environment, exam, 0 op

Voimassaolo: - 31.07.2019

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Field of Geography

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

791629S: Traditions and current issues in tourism research, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Geography

Arvostelu: 1 - 5, pass, fail

Opettajat: Kaarina Tervo-Kankare

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay791629S Traditions and current issues in tourism research (OPEN UNI) 5.0 op

ECTS Credits:

5 ECTS

Language of instruction:

Finnish/English

Timing:

1st or 2nd MSc-year, 2nd semester.

Learning outcomes:

Following the completion of the course the learner has deepened her/his knowledge on the research traditions and current issues in tourism geographies.

The course is structured around lectures and studies based on the department's researchers' and/or visiting scholars' and PhD students' demonstrations, and will provide insights to students on timely issues in tourism research, development, planning and/or management.

After the course the student will be able to: know and describe the basic concepts and theories of lecture/course subjects; evaluate the importance of lecture/course subjects; contextualise and integrate lecture/course subjects to Finnish or other specific regional context. In addition he/she will demonstrate competencies in oral and written presentations, teamwork and ability to critically evaluate others' viewpoints.

Contents:

Key theories, concepts and perspectives introduced during the course and based on the introduced cases studies.

Mode of delivery:

Face-to-face learning.

Learning activities and teaching methods:

16 hrs lectures, group work, written and oral assignments, and exam or report.

Target group:

Especially students of Tourism Geography.

Prerequisites and co-requisites:

-

Recommended optional programme components:

-

Recommended or required reading:

Will be announced when the course starts.

Assessment methods and criteria:

Written exam and assignments.

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

Grading:

1-5.

Person responsible:

Kaarina Tervo-Kankare

Working life cooperation:

No.

Other information:

This course will be organized uneven years. Next time this course will be in semester 2, 2017 (or, if possible in every year). Alternatively, this course may be performed by case study based on recent literary and its written and oral presentation.

761310A: Wave motion and optics, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opettajat: Seppo Alanko

Opintokohteen kielet: Finnish

Leikkaavuudet:

766349A	Wave motion and optics	7.0 op
761114P	Wave motion and optics	5.0 op
761114P-02	Wave motion and optics, lab. exercises	0.0 op
761114P-01	Wave motion and optics, lectures and exam	0.0 op
766329A	Wave motion and optics	6.0 op
761104P	Wave Motion	3.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work

Language of instruction:

Finnish. The course material and exercises are available in English.

Timing:

First spring

Learning outcomes:

The student is able to treat different types of waves by methods of general theory of wave motion. The student is also able to solve problems related to basic optics and apply her/his knowledge to teaching and research in physics.

Contents:

General principles of wave motion, sound, electromagnetic waves, propagation of light, image formation in mirrors and lenses, optical instruments, interference, Fraunhofer diffraction, diffraction grating.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 28 h, exercises 14 h, 2 laboratory exercises (3 hours/exercise), self-study 90 h

Target group:

No specific target group

Prerequisites and co-requisites:

Basic skills in mathematics.

Recommended optional programme components:

No alternative course units or course units that should be completed simultaneously

Recommended or required reading:

H. D. Young and R. A. Freedman, University Physics, Addison-Wesley, 2000 ja 2004, F. L. Pedrotti ja L. S. Pedrotti, Introduction to optics, Prentice-Hall, 2. ed., 1993 ja E. Hecht, Optics, (3rd ed.), Addison Wesley Longman, 1998.

Assessment methods and criteria:

Two written intermediate examinations or one final examination

Grading:

Numerical grading scale 0 – 5, where 0 is fail

Person responsible:

Seppo Alanko

Working life cooperation:

No work placement period

Other information:

Includes parts:

761310A-01 Wave motion and optics, lectures and exam

761310A-02 Wave motion and optics, lab. exercises

Compulsory

761310A-01: Wave motion and optics, lectures and exam, 0 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opettajat: Seppo Alanko

Opintokohteen kielet: Finnish

Leikkaavuudet:

766349A	Wave motion and optics	7.0 op
761114P	Wave motion and optics	5.0 op
761114P-01	Wave motion and optics, lectures and exam	0.0 op
761114P-02	Wave motion and optics, lab. exercises	0.0 op
766329A	Wave motion and optics	6.0 op
761104P	Wave Motion	3.0 op

Language of instruction:

Finnish. The course material and exercises are available in English.

Timing:

Firts spring

Learning outcomes:

The student is able to treat different types of waves by methods of general theory of wave motion. The student is also able to solve problems related to basic optics and apply her/his knowledge to teaching and research in physics.

Contents:

General principles of wave motion, sound, electromagnetic waves, propagation of light, image formation in mirrors and lenses, optical instruments, interference, Fraunhofer diffraction, diffraction grating.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 28 h, exercises 14 h, 2 laboratory exercises (3 hours/exercise), self-study 90 h

Target group:

No specific target group

Prerequisites and co-requisites:

Basic skills in mathematics

Recommended optional programme components:

No alternative course units or course units that should be completed simultaneously.

Recommended or required reading:

H. D. Young and R. A. Freedman, University Physics, Addison-Wesley, 2000 ja 2004, F. L. Pedrotti ja L. S. Pedrotti, Introduction to optics, Prentice-Hall, 2. ed., 1993 ja E. Hecht, Optics, (3rd ed.), Addison Wesley Longman, 1998.

Assessment methods and criteria:

Two written intermediate examinations or one final examination

Grading:

Numerical grading scale 0 – 5, where 0 is fail

Person responsible:

Seppo Alanko

Working life cooperation:

No work placement period

761310A-02: Wave motion and optics, lab. exercises, 0 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

766349A	Wave motion and optics	7.0 op
761114P	Wave motion and optics	5.0 op
761114P-01	Wave motion and optics, lectures and exam	0.0 op
761114P-02	Wave motion and optics, lab. exercises	0.0 op
766329A	Wave motion and optics	6.0 op
761104P	Wave Motion	3.0 op

Ei opintojaksokuvauksia.

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

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Jouni Aspi, Kari Koivula

Opintokohteen kielet: Finnish

Leikkaavuudet:

751368A	Wildlife management and game animal ecology	6.0 op
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ECTS Credits:

5 cr / 133 hours of work.

Language of instruction:

Finnish / English.

Timing:

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

Learning outcomes:

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

Contents:

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

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

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

Target group:

-

Prerequisites and co-requisites:

No.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Seminar with report and exam.

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

Grading:

1-5 / Fail.

Person responsible:

Prof. Jouni Aspi ja Doc. Kari Koivula.

Working life cooperation:

Yes.

Other information:

-

750377A: Winter ecology and physiology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Taulavuori

Opintokohteen kielet: Finnish

Leikkaavuudet:

750325A Winter ecology and physiology 3.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

English.

Timing:

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

Learning outcomes:

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

Contents:

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

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures, exercises, report and seminar presentation.

Target group:

Biology students.

Prerequisites and co-requisites:

Courses Basics of ecology (750124P), Cell biology (750121P), Terrestrial animals field course (755322A), Aquatic ecology field course (755321A), Plant ecology field course (756343A) and Basics of plant biology, lectures (756346A) or equivalent knowledge.

Recommended optional programme components:

Recommended or required reading:

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

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

Assessment methods and criteria:

Seminar presentation and book exam.

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

Grading:

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

Person responsible:

Doc. Kari Taulavuori.

Working life cooperation:

No.

Other information:

-

790349A: World regional geography, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Geography

Arvostelu: 1 - 5, pass, fail

Opettajat: Janne Alahuhta

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay790349A World regional geography (OPEN UNI) 5.0 op

ECTS Credits:

5 ECTS

Language of instruction:

Finnish and English.

Timing:

2nd or 3rd year, 1st or 2nd semester.

Learning outcomes:

After the course, the student can define and interpret different regional phenomena and processes in the global level.

Contents:

Regional phenomena of the world and their role in Physical Geography.

Mode of delivery:

Online course in Moodle: <https://moodle oulu fi/course/view.php?id=584>

Target group:

Recommended for teachers, others voluntary.

Prerequisites and co-requisites:

-

Recommended optional programme components:

Course is part of the minor studies of geography.

Assessment methods and criteria:

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

Grading:

1–5.

Person responsible:

Janne Alahuhta

Working life cooperation:

No.

Other information:

The course will be arranged twice during an academic year. The course consist of five periods. Each of these periods last for two weeks.

