Opasraportti

FTech - Field of Chemistry (2020 - 2021)

University’s new study guide for academic year 2020-2021 is published at https://opas.peppi.oulu.fi

The study guide includes information on degrees, curriculums, courses and course timetables. Course registrations are still done in Oodi.

If you have questions on information in the study guide, please contact the study field's Academic Affairs Service Team https://www.oulu.fi/forstudents/faculty-study-affairs

Tutkintorakenteet

B.Sc. Degree in Chemistry (Teacher training)

Tutkintorakenteen tila: published

Lukuvuosi: 2020-21

Lukuvuoden alkamispäivämäärä: 01.08.2020

General Studies 8 cr (vähintään 8 op)

Compulsory Studies 8 cr

902002Y: English 1 (Reading for Academic Purposes), 2 op
902004Y: English 2 (Scientific Communication), 2 op
030005P: Information Skills, 1 op
780078Y: Orientation Course for New Students, 1 op
901035Y: Second Official Language (Swedish), Oral Skills, 1 op
901034Y: Second Official Language (Swedish), Written Skills, 1 op

Optional courses

780079Y: Tutoring, 1 op

Major Studies in Chemistry 87 cr (vähintään 87 op)

Basic Studies in Chemisty

A325201: Chemistry, Basic Studies, 25 - 31,5 op
be
780117P: General and Inorganic Chemistry A, 5 op

780118P: General and Inorganic Chemistry B, 5 op
780116P: Introduction to Organic Chemistry, 5 op
780119P: Introduction to Analytical Chemistry, 5 op
780127P: Principles of Chemistry Labwork, 5 op

Intermediate Studies in Chemistry (62 credits)

781321A: Bachelor's Thesis, 8 op
781301A: Inorganic Chemistry I, 5 op
781302A: Inorganic Chemistry II, 5 op
780354A: Laboratory Course I in Inorganic Chemistry, 5 op
781307A: Laboratory Course I in Organic Chemistry, 5 op
780331A: Laboratory Course I in Physical Chemistry, 5 op
780381A: Maturity test, 0 op
781305A: Organic Chemistry I, 5 op
781306A: Organic Chemistry II, 5 op
781303A: Physical Chemistry I, 5 op
781304A: Physical Chemistry II, 5 op
780301A: Research Training, 9 op

Subsidiary Entity for Subject Teacher (60 credits) (40 - 50 op)

Physics, Mathematics or Information Processing Science. See more closely in the curriculum of the Degree Programme of Physics, in the Degree Programme of Mathematics or in the Degree Programme of Information Processing Science.

Mathematics 60 credits

802354A: Basics in Algebra, 5 op
800317A: Continuity and derivative, 5 op
800119P: Functions and limit, 5 op
800318A: Integral, 5 op
802120P: Introduction to Matrices, 5 op
806113P: Introduction to Statistics, 5 op
802151P: Introduction to mathematical deduction, 5 op
802320A: Linear Algebra, 5 op
801195P: Probability Theory, 5 op

Physics

761313A: Atomic physics 1, 5 op
761119P: Electromagnetism 1, 5 op
761312A: Electromagnetism 2, 5 op
761115P: Laboratory Exercises in Physics 1, 5 op
Compulsory
761115P-01: Laboratory Exercises in Physics 1, lecture and exam, 0 op
761115P-02: Laboratory Exercises in Physics 1, laboratory exercises, 0 op
761120P: Laboratory Exercises in Physics 2, 5 op
761118P: Mechanics 1, 5 op
766344A: Nuclear and particle physics, 5 op
761108P: Physical world view, 5 op
761314A: Thermophysics, 5 op
761310A: Wave motion and optics, 5 op

Information Processing Science

Other subject

Optional Studies (vähintään 2 op)

Optional studies can include for instance the second minor subject studies.

Some Instructions for Making the Personal Study Plan

-The personal study plan should be planned so that courses cover circa 60 credits per year and the B.Sc. Degree will be achiieved in three years.

-The B.Sc. Degree can include advanced studies (Code xxxxxxS). But it is best to plased advanced studies in Master Studies.

-Only free of charge optional language studies can be added to the personal study plan.

B.Sc. Degree in Chemistry (Chemist)

Tutkintorakenteen tila: published

Lukuvuosi: 2020-21

Lukuvuoden alkamispäivämäärä: 01.08.2020

General Studies 8 cr (vähintään 8 op)

Compulsory Studies

902002Y: English 1 (Reading for Academic Purposes), 2 op
902004Y: English 2 (Scientific Communication), 2 op
030005P: Information Skills, 1 op
780078Y: Orientation Course for New Students, 1 op
901035Y: Second Official Language (Swedish), Oral Skills, 1 op
901034Y: Second Official Language (Swedish), Written Skills, 1 op

Optional courses

780079Y: Tutoring, 1 op

Major Studies in Chemistry 92 cr (vähintään 92 op)

Basic Studies in Chemisty (25 cr)

A325201: Chemistry, Basic Studies, 25 - 31,5 op
be
780117P: General and Inorganic Chemistry A, 5 op
780118P: General and Inorganic Chemistry B, 5 op
780116P: Introduction to Organic Chemistry, 5 op
780119P: Introduction to Analytical Chemistry, 5 op
780127P: Principles of Chemistry Labwork, 5 op

Intermediate Studies in Chemistry

781321A: Bachelor's Thesis, 8 op
781301A: Inorganic Chemistry I, 5 op
781302A: Inorganic Chemistry II, 5 op
781308A: Instrumental Analysis, 5 op
780354A: Laboratory Course I in Inorganic Chemistry, 5 op
781307A: Laboratory Course I in Organic Chemistry, 5 op
780331A: Laboratory Course I in Physical Chemistry, 5 op
780381A: Maturity test, 0 op
781305A: Organic Chemistry I, 5 op

781306A: Organic Chemistry II, 5 op
781303A: Physical Chemistry I, 5 op
781304A: Physical Chemistry II, 5 op
780301A: Research Training, 9 op

Minor Studies (vähintään 50 op)

The B.Sc. Degree in Chemistry should include the basic studies of two minor subjects (2 x 25 credits) (or the basic studies and the intermediate studies of one minor subject, 60 credits in all).

Basic or Intermediate Studies in Mathematics 25-60 credits

800119P: Functions and limit, 5 op
802120P: Introduction to Matrices, 5 op
802151P: Introduction to mathematical deduction, 5 op

Basic Studies in Physics 25 credits

761115P: Laboratory Exercises in Physics 1, 5 op
Compulsory
761115P-01: Laboratory Exercises in Physics 1, lecture and exam, 0 op
761115P-02: Laboratory Exercises in Physics 1, laboratory exercises, 0 op
761118P: Mechanics 1, 5 op
761108P: Physical world view, 5 op

Process Engineering (optional)

477013P: Introduction to Process and Environmental Engineering, 5 op
477221A: Material and Energy Balances, 5 op
477222A: Reactor Analysis, 5 op

Biochemistry (optional)

Biology (optional)

Geology (optional)

771117P: Basic course in mineralogy, 5 op
771113P: Introduction to Geology I, 5 op
771114P: Introduction to Geology II, 5 op
771116P: Introduction to Quaternary deposits of Finland and their resources, 5 op
771115P: Introduction to bedrock geology of Finland and ore geology, 5 op

Other Minor 1 (optional)

Other Minor 2 (optional)

Optional Studies (vähintään 30 op)

Add courses here only in a case that the total amount of credits of your personal study plan is under 180 credits.

Some Instructions for Making the Personal Study Plan

-The personal study plan should be planned so that courses cover circa 60 credits per year and the B.Sc. Degree will be achiieved in three years.

-The B.Sc. Degree can not include advanced studies (Code xxxxxxS). Advanced studies are placed in Master Studies.

-Only free of charge optional language studies can be added to the personal study plan.

M.Sc. Degree in Chemistry (Teacher training) (8.1.2021)

Tutkintorakenteen tila: published

Lukuvuosi: 2020-21

Lukuvuoden alkamispäivämäärä: 01.08.2020

Compulsory Studies in Chemistry 20 cr (vähintään 20 op)

Advanced Studies for All (compulsory)

780699S: Maturity Test, 0 op

Major Analytical Chemistry

781635S: Master's Thesis in Analytical Chemistry, 20 op

Major in Inorganic Chemistry (teacher training) (compulsory)

781602S: Master's Thesis in Inorganic Chemistry, 20 op

Major Physical Chemistry (teacher training) (compulsory)

782602S: Master's Thesis in Physical Chemistry, 20 op

Major Organic Chemistry (teacher training) (compulsory)

783602S: Master's Thesis in Organic Chemistry, 20 op

Major Applied Chemistry

780682S: Master's Thesis in Applied Chemistry, 20 op

Optional Advanced Courses in Chemistry 40 cr ; Realization 2020-2021 and 2021-2022 (vähintään 40 op)

Optional Advanced Courses in Chemistry have to be taken 40 credits.

Realization 2020-2021: 781650S ; 781648S ; 781652S ; 781649S ; 782639S ; 781654S ; 780660S.

Realization 2021-2022:781651S ; 781657S ; 781658S ; 781627S ; 781655S ; 782641S ; 782638S ; 782637S ; 781661S.

Every Year: 783639S ; 780600S ; 780683S ; 780670S ;782640S ; 782608S ; 782640S ; 783608S ; 780660S.

Pedagogical Studies (compulsory) 60 cr (vähintään 60 op)

Pedagogical Studies have to be taken 60 cr. See more closely in the curriculum of the Degree Programme in Teacher´s Pedegogical Studies.

050124A: Advanced Practice, 5 op
050121A: Basic Practice, 5 op
050122A: Broadly Based Subject Didactics, 5 op
410084P: Education as an Object of Scientific Research, 5 op

410085P: Growth, Development and Learning, 5 op
410088P: Philosophical and Ethical Foundations and Objectives of Education, 5 op
050123A: Research-Based Subject Didactics, 10 op
410087P: Sociocultural Contexts of Education, 5 op
050120A: Subject Didactics, 5 op
050125A: Teacher as a Researcher in Teaching Practice, 5 op
410086P: Teaching and Educational Interaction, 5 op

M.Sc. Degree in Chemistry 8.1.2021

Tutkintorakenteen tila: published

Lukuvuosi: 2020-21

Lukuvuoden alkamispäivämäärä: 01.08.2020

Compulsory Studies in Chemistry 65 cr (vähintään 65 op)

Advanced Studies in Chemistry for All (compulsory)

780699S: Maturity Test, 0 op
780601S: Project work, 12 op
780690S: Seminar, 3 op

Major Analytical Chemistry

781635S: Master's Thesis in Analytical Chemistry, 20 op
781660S: Research Project in Analytical Chemistry, 30 op

Major Inorganic Chemistry

781602S: Master's Thesis in Inorganic Chemistry, 20 op
781607S: Research Project in Inorganic Chemistry, 30 op

Major Physical Chemistry

782602S: Master's Thesis in Physical Chemistry, 20 op
782607S: Research Project in Physical Chemistry, 30 op

Major Organic Chemistry

783602S: Master's Thesis in Organic Chemistry, 20 op
783607S: Research Project in Organic Chemistry, 30 op

Major Applied Chemistry

780682S: Master's Thesis in Applied Chemistry, 20 op
780685S: Research Project in Applied Chemistry, 30 op

Optional Advanced Courses in Chemistry 30 cr ; Realization 2020-2021 and 2021-2022. (vähintään 30 op)

Optional Advanced Courses in Chemistry have to be taken 30 credits.

Realization 2020-2021: 781650S ; 781648S ; 781652S ; 781649S ; 782639S ; 781654S ; 780660S.

Realization 2021-2022:781651S ; 781657S ; 781658S ; 781627S ; 781655S ; 782641S ; 782638S ; 782637S ; 781661S.

Every Year: 783639S ; 780600S ; 780683S ; 780670S ;782640S ; 782608S ; 782640S ; 783608S ; 780660S.

Optional Studies (enintään 25 op)

Optional studies can be optional advanced studies in chemistry, or basic, intermediate or advanced studies in minor subjects. Only free of charge opitional language studies can be added to the personal study plan and should be discussed with the hops tutor.

Opintojaksojen kuvaukset

Tutkintorakenteisiin kuuluvien opintokohteiden kuvaukset

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

Voimassaolo: 01.08.1995 -
Opiskelumuoto: Language and Communication Studies
Laji: Course
Vastuuyksikkö: Languages and Communication
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: English

Proficiency level:
B2-C1
Status:
This course is mandatory for students who choose English as their foreign language in the following B.Sc. degree programmes:

Faculty of Natural Sciences

- Biology
- Mathematical and Physical Sciences.

Faculty of Technology

- Chemistry
- Geosciences.

Note:
Please consult your faculty's Study Guide to establish the language requirements for your own degree program.

Required proficiency level:
English must have been the A1 or A2 language at school, or equivalent skills in English must have been otherwise acquired. If you need to take English, but lack the background, please get in touch with the Languages and Communication contact teacher to discuss individual solutions.
ECTS Credits:
2 ECTS / 53 hours of work
Language of instruction:
English
Timing:
Biology: 1st year spring term (periods 3 and 4)
Mathematical and Physical Sciences: 1st year autumn term (periods 1 and 2)
Chemistry: 1st year autumn term (periods 1 and 2)

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

Learning outcomes:

By the end of the course, you are expected to demonstrate the ability to:
utilize your knowledge of word formation, text structure, and cohesion markers to understand the vocabulary and content of academic texts,
use effective reading strategies and techniques for studying vocabulary, and
summarize texts both orally or in writing.

Contents:

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

Mode of delivery:

The course is implemented using blended methods, which may include web-based teaching and face-to-face teaching. The course utilizes the Moodle learning environment.

Learning activities and teaching methods:

The English 1 course is adapted to accommodate many different fields of study, and thus the materials and implementation methods of the course vary. There will be 26 hours of guided teaching events and 28 hours of independent study, either individually or in a group.

Target group:

Faculty of Natural Sciences:1st-year students of Biology, Mathematical & Physical Sciences
Faculty of Technology: 1st-year students of Chemistry, Geosciences

Prerequisites and co-requisites:

Post-requisite Students are also required to take English 2 902004Y following completion of this course.

Recommended optional programme components:

None

Recommended or required reading:

Course materials used will be available from the library or online.

Assessment methods and criteria:

Continuous assessment takes into account active and regular participation in classroom sessions and successful completion of all homework tasks, There are three monthly tests on material covered so far. The assessment of the course is based on the learning outcomes listed above.

Grading:

The course utilises a grading scale of Pass/Fail.

Person responsible:

Karen Niskanen

Working life cooperation:

The course does not contain working life cooperation.

Other information:

N.B. Students with grades laudatur or eximia in their A1 English school-leaving examination can be exempted from this course and will be granted the credits by your faculty. Contact the faculty for information.

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

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Leikkaavuudet:

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

Proficiency level:

B2 - C1

Status:
This course is mandatory for students who choose English as their foreign language in the following B.Sc. degree programs:
Faculty of Natural Sciences:
Biology
Mathematical & Physical Sciences.
Faculty of Technology:
Chemistry
Geoscience.

Required proficiency level:
Students taking this course must have had English as the A1 or A2 language at school or have equivalent skills.
ECTS Credits:
2 ECTS credits / 53 hours of work.
Language of instruction:
English
Timing:
Biology: 2nd year autumn term (periods 1 and 2)
Mathematic and Physical Sciences 1st year spring term (periods 3 and 4)
Chemistry: 2nd year spring term (periods 3 and 4)
Geosciences: 2nd year spring term (periods 3 and 4)

Learning outcomes:
By the end of the course, you are expected to have demonstrated the ability to:
use appropriate strategies and techniques for communicating effectively in English in an academic context in your own field
prepare and present scientific subjects from your own field of studies to your classmates, using appropriate field-related vocabulary.

Contents:
In the classroom, you will practice the skills of listening, speaking and presenting topics in your own field. The emphasis is on working in pairs and small groups. In addition, you will complete independent homework assignments to support the classroom learning.
Mode of delivery:
The course is implemented using blended methods, which may include distance teaching, classroom instruction and activities in the Moodle learning environment.
Learning activities and teaching methods:
The English 2 course is tailored to the needs of students in different fields of study, and thus the materials and implementation methods of the course vary between groups. The teacher will provide a more detailed schedule and list of homework tasks. There will be 26 hours of guided teaching events and 28 hours of independent work, including both individual and group work.

Target group:
2nd year students of Biology, Chemistry, Geoscience
1st year students of Mathematical and Physical Sciences

Prerequisites and co-requisites:
Prequisite course: 902002Y English 1, unless exempted
Recommended optional programme components:
-
Recommended or required reading:
Materials will be provided in electronic format or are available from the library.
Assessment methods and criteria:

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

Grading:
Pass / fail.
Person responsible:
Karen Niskanen
Working life cooperation:
-
Other information:
-

030005P: Information Skills, 1 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Technology

Arvostelu: 1 - 5, pass, fail

Opettajat: Ursula Heinikoski

Opintokohteen kielet: Finnish

Leikkaavuudet:

030004P Introduction to Information Retrieval 0.0 op

ECTS Credits:
1 ECTS credit / 27 hours of work
Language of instruction:
Finnish
Timing:
Architecture 3. spring semester, period III;
biochemistry 3. autumn semester;
biology 3. autumn semester, period I;
chemistry 3. autumn semester, period I;
civil engineering 2. spring semester, period IV;
computer science and engineering 2. spring semester, period IV;
electronics and communications engineering 3. spring semester;
geosciences 2. spring semester, period IV;
geography 3. semester, periods I and III;
industrial engineering and management 3. year;
information processing sciences 1. or 3. year;
mathematics and physics 1. spring semester, period III;
mechanical engineering 3. year;
mining engineering and mineral processing 3. year;
process and environmental engineering 2. year, period II;
Master's degree students in industrial engineering and management 1st year.
Learning outcomes:
Upon completion of the course, the students:
- can search scientific information,
- can use the most important databases of their discipline,
- know how to evaluate search results and information sources,
- can use the reference management tool.
Contents:
Scientific information retrieval process, the most important databases and publication channels of the discipline, evaluation of the reliability of information sources and reference management tool.
Mode of delivery:
Blended teaching: classroom training, web-based learning material and exercises, a group assignment.
Learning activities and teaching methods:
Training sessions 8 h, group working 7 h, self-study 12 h
Target group:

Compulsory for all bachelor degree students of Faculty of information technology and electrical engineering, Faculty of Technology and Faculty of science. Compulsory also for those Master's degree students in Industrial Engineering and Management who have no earlier studies in the information skills. Optional for the students of biochemistry.
Recommended optional programme components:
In biochemistry the course is completed as a part of 740376A Bachelor's Thesis.
Recommended or required reading:
Web learning material Tieteellisen tiedonhankinnan opas
Assessment methods and criteria:
Passing the course requires participation in the training sessions and successful completion of the course assignments.
Grading:
pass/fail
Person responsible:
Ursula Heinikoski

780078Y: Orientation Course for New Students, 1 op

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Matti Niemelä

Opintokohteen kielet: Finnish

ECTS Credits:
1 credits / 27 hours of work
Language of instruction:
Finnish
Timing:
1 st autumn and 1 st spring.
Learning outcomes:
Upon completion of the course:
- The student should be able to find different places in the learning environment
- He/she also knows how to register for courses and examinations.
- He/she can use the services offered to students by the university and the Student Union.
- After making the personal study plan, the student can describe the structure of B.Sc. degree in chemistry

Contents:
The course comprises several modules: Orientation week program, orientation in small groups, tutor teaching meetings and PSP (Personal Study Plan).
Mode of delivery:
Face-to-face teaching, compulsory
Learning activities and teaching methods:
The programme of the orientation week, orientation in small groups: 10-15 hours of visits and discussions with the group tutor and tutor teacher. Making of PSP (Personal Study Plan).
Target group:
Chemistry, compulsory
Prerequisites and co-requisites:
No prerequisites
Recommended optional programme components:
The course is an independent entity and does not require additional studies carried out at the same time.
Recommended or required reading:
Material given by tutors
Assessment methods and criteria:
Participation in the programme of the orientation week, small group meetings, tutor teaching meetings and making a Personal Study Plan for B.Sc. Degree (and M.Sc. Degree).
Grading:
The course utilizes verbal grading scale pass/fail.
Person responsible:
Matti Niemelä, Helena Tirri, Small group tutors
Working life cooperation:
No

Other information:
The course is completed when all course parts are passed.

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

Voimassaolo: 01.08.2014 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Opintokohteen kielet: Swedish

Leikkaavuudet:

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

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

901004Y Swedish 2.0 op

Proficiency level:
This course is only for Finnish speaking students with CEFR-level A2-B1 in Swedish language. There are no beginner courses in Swedish at the university.

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

Voimassaolo: 01.08.2014 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Opintokohteen kielet: Swedish

Leikkaavuudet:

901060Y Second Official Language (Swedish), Written Skills 1.0 op

ay901034Y Second Official Language (Swedish), Written Skills (OPEN UNI) 1.0 op

901004Y Swedish 2.0 op

Proficiency level:
B1/B2/C1
This course is only for Finnish speaking students with CEFR-level A2 in Swedish language. We don’t offer Beginners courses in Swedish.
Status:

Required proficiency level:

Contents:

Learning activities and teaching methods:

Recommended optional programme components:
-
Recommended or required reading:

Assessment methods and criteria:

Working life cooperation:
-

780079Y: Tutoring, 1 op

Opiskelumuoto: General Studies
Laji: Course
Vastuuyksikkö: Field of Chemistry
Arvostelu: 1 - 5, pass, fail
Opettajat: Helena Tirri
Opintokohteen kielet: Finnish

ECTS Credits:
1 credits/ 27 hours of work
Language of instruction:
Finnish
Timing:
2 nd autumn or 3 rd autumn
Learning outcomes:
Upon completion of the course, the student can act as a group leader. He/she can tell to other people about the department of chemistry as well as the studies in the degree programme of chemistry.

Contents:
Meetings and discussions with the small group. Tours in the university campus.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Meetings and discussions with the small group. Tours in the university campus.
Target group:
Chemistry. Optional
Prerequisites and co-requisites:
2nd or 3th year student
Recommended optional programme components:
The course is an independent entity and does not require additional studies carried out at the same time.
Recommended or required reading:
Material given by the Student Services, Faculty of Science and the Department of Chemistry in their schoolings.
Assessment methods and criteria:
The student acts as small group leader in the degree programme of chemistry. After this, he/she collects the feedback from the students and makes a report about the course. The feedback is attached to the report.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
The course utilizes verbal grading scale pass/fail.
Person responsible:
Amanuensis and Student Services
Working life cooperation:
No
Other information:
No

A325201: Chemistry, Basic Studies, 25 - 31,5 op

Opiskelumuoto: Basic Studies
Laji: Study module
Vastuuyksikkö: Field of Chemistry
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish
Voidaan suorittaa useasti: Kyllä

Ei opintojaksokuvauksia.

be

780117P: General and Inorganic Chemistry A, 5 op

Voimassaolo: 01.08.2015 -
Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Field of Chemistry
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish
Leikkaavuudet:

780120P	Basic Principles in Chemistry	5.0 op
ay780117P	General and Inorganic Chemistry A (OPEN UNI)	5.0 op
780115P	General and Inorganic Chemistry II	6.0 op
780114P	General and Inorganic Chemistry I	6.0 op
780113P	Introduction to Chemistry	12.0 op
780102P	Introduction to Inorganic Chemistry	5.0 op
780109P	Basic Principles in Chemistry	4.0 op

ECTS Credits:

5 credits / 134 hours of work

Language of instruction:

Finnish

Timing:

1st autumn

Learning outcomes:

After this course, the student:
- can explain organic and inorganic chemistry fundamentals, basic concepts and terminology.
- understand basic concepts of chemistry as described in international general chemistry curriculum.

Contents:

Basic concepts of chemistry, chemical formula, chemical reaction, chemical equation, oxidation-reduction reactions, stoichiometry, gases, chemical equilibrium, acids and bases, additional aspects of acid-base equilibria, solubility and complex-ion equilibria.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

30 hours of lectures and applications, 20 hours of exercises and 85 hours of self-study.

Target group:

Biochemistry, Chemistry compulsory. In the entity of 25 credits (minor studies), compulsory.
Physical sciences, Mathematical sciences, optional.

Prerequisites and co-requisites:

Upper secondary school chemistry.

Recommended optional programme components:

-

Recommended or required reading:

Petrucci, R.H., Herring, F.G., Madura, J.D. ja Bissonnette, C.: General Chemistry: Principles and Modern Applications, 11. edition (also 7., 8., 9. ja 10. edition), Pearson Canada Inc., Toronto, 2017. Chapters 1-6, 14.2, 15-18.

Assessment methods and criteria:

Two intermediate examinations or one final examination.
Read more about assessment criteria at the University of Oulu webpage.

Grading:

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

Person responsible:

Johanna Havia

Working life cooperation:

No

Other information:

No

780118P: General and Inorganic Chemistry B, 5 op

Voimassaolo: 01.08.2015 -
Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Field of Chemistry
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish
Leikkaavuudet:

ay780118P	General and Inorganic Chemistry B (OPEN UNI)	5.0 op
780114P	General and Inorganic Chemistry I	6.0 op
780115P	General and Inorganic Chemistry II	6.0 op
780113P	Introduction to Chemistry	12.0 op
780101P	Introduction to Physical Chemistry	7.0 op
780102P	Introduction to Inorganic Chemistry	5.0 op

ECTS Credits:

5 ECTS credits / 134 hours of work

Language of instruction:

Finnish

Timing:

1st autumn

Learning outcomes:

After this course, the student:
- can explain inorganic chemistry fundamentals, basic concepts and terminology
- understand basic concepts of chemistry as described in international general chemistry curriculum.

Contents:

Thermodynamics, reaction kinetics, electrochemistry, electrons in atoms, periodic table, chemical bond, intermolecular forces.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

32 hours of lectures and applications, 18 hours of exercises, 85 hours of self-study.

Target group:

Biochemistry, Chemistry, compulsory. In the entity of 25 credits (minor studies), compulsory.
Physical sciences, Mathematical sciences, optional.

Prerequisites and co-requisites:

Upper secondary school chemistry.

Recommended optional programme components:

-

Recommended or required reading:

Petrucci, R.H., Herring, F.G., Madura, J.D. ja Bissonnette, C.: General Chemistry: Principles and Modern Applications, 11. edition (also 7., 8., 9. ja 10. edition), Pearson Canada Inc., Toronto, 2017. Chapters 7-11.1- 11.7, 12.1, 13, 19-20.

Assessment methods and criteria:

Two intermediate examinations or one final examination.
Read more about assessment criteria at the University of Oulu webpage.

Grading:

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

Person responsible:

Matti Niemelä

Working life cooperation:

No

Other information:

No

780116P: Introduction to Organic Chemistry, 5 op

Voimassaolo: 01.08.2015 -
Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Field of Chemistry
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish
Leikkaavuudet:

ay780116P	Introduction to Organic Chemistry (OPEN UNI)	5.0 op
780103P2	Organic Chemistry I	6.0 op
780108P	Basic Course in Organic Chemistry	6.0 op
780112P	Introduction to Organic Chemistry	4.0 op
780103P	Introduction to Organic Chemistry	6.0 op

ECTS Credits:

5 ECTS credits / 134 hours of work

Language of instruction:

Finnish. Book-examination in English as well.

Timing:

1st spring

Learning outcomes:

After this course, the student:
- can recognize and name basic organic compunds and explain their properties.
- can explain organic chemistry basic consepts.
- can deduce basic recation types and solve their mechanisms.

Contents:

Classification of organic compounds and their properties. Basic reactions of organic compounds: addition, elimination and substitution along with the reaction mechanisms. Basics of stereochemistry.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

38 hours of lectures plus 12 hours of exercises, 84 hours of independent self-study.

Target group:

Biochemistry, Chemistry, Biology, Process Engineering, Environmental Engineering and in the study entity of 25 credits, compulsory.
Physical Sciences, Geology, Geograhpy, Mathematical Sciences, optional.

Prerequisites and co-requisites:

Upper secondary school chemistry

Recommended optional programme components:

The course is an independent entity and does not require additional studies carried out at the same time.

Recommended or required reading:

Hart, H.: Organic Chemistry: A Short Course, 10. ed. or newer, Houhgton Mifflin, Boston, 1999; Hart, H. ja Hart, D.: Study Guide & Solutions Book, Organic Chemistry: A Short Course, 10. ed. or newer, Houghton Mifflin, Boston, 1999 and material in Moodle.

Assessment methods and criteria:

Two intermediate examinations or one final examination.
Read more about assessment criteria at the University of Oulu webpage.

Grading:

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

Person responsible:

Johanna Kärkkäinen

Working life cooperation:

No

780119P: Introduction to Analytical Chemistry, 5 op

Voimassaolo: 01.08.2015 -
Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Field of Chemistry
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish
Leikkaavuudet:

780111P	Introduction to Analytical Chemistry	4.0 op
780110P	Analytical Chemistry I	5.5 op

ECTS Credits:

5 ECTS credits / 134 hours of work

Language of instruction:

Finnish

Timing:

2nd autumn

Learning outcomes:

Upon completion the student should have acquired knowledge and understanding of basic concepts of quantitative chemical analysis employing classical methods of analysis.

Contents:

Steps in quantitative analysis, statistical evaluation of analytical data, chemical equilibrium in aqueous solutions, gravimetry, titrimetry, spectrophotometry.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

30 hours of lectures + 20 hours of exercises + 84 hours of self-study

Target group:

Chemistry, compulsory. In the study entity of 25 credits compulsory.

Mathematical Sciences, Physical Sciences, optional.

Prerequisites and co-requisites:

General and Inorganic Chemistry A (780117P) and General and Inorganic Chemistry B (780118P), or General and Inorganic Chemistry I (780114P) and General and Inorganic Chemistry II (780115P), or Introduction to Chemistry (780113P), or Basic Principles in Chemistry (780109P).

Recommended optional programme components:

The course is an independent entity and does not require additional studies carried out at the same time.

Recommended or required reading:

Harvey, D.: Analytical Chemistry 2.0-an open-access digital textbook (can be loaded from Internet).
Saarinen, H. ja Lajunen, L.H.J.: Analyyttisen kemian perusteet, Oulun yliopistopaino, 2004.

Assessment methods and criteria:

Two intermediate examinations or one final examination.

Grading:

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

Person responsible:

Paavo Perämäki

Working life cooperation:

No

780127P: Principles of Chemistry Labwork, 5 op

Voimassaolo: 01.08.2015 -
Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Field of Chemistry
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish
Leikkaavuudet:

780123P	Introductory Laboratory Works in Chemistry	5.0 op
780330A-01	Laboratory Course I in Inorganic Chemistry (1. part)	2.0 op
780122P	Introductory Laboratory Course in Chemistry	3.0 op

ECTS Credits:

5 credits / 135 hours of work

Language of instruction:

Finnish

Timing:

1st spring

Learning outcomes:

After this course, the student can apply laboratory safety instructions and act accordingly. He/she can communicate by using basic laboratory terminology, identifies basic laboratory equipment and can use them properly. He/she recognizes the importance of the planning of the laboratory work. The student is able to utilize the basic chemistry techniques and determination methods in the given task. Furthermore, the student can also make laboratory notes and write a report on the performed task.

Contents:

Laboratory safety, basic laboratory equipment, basic chemistry techniques and determination methods as well as some of their theoretical background, problems related to the studied determination methods, keeping a laboratory notebook, writing a report.

Mode of delivery:

Supervised laboratory work, independently done preparatory problems and reports.

Learning activities and teaching methods:

Safety in laboratory 2 hours, 60 hours of laboratory works, 73 hours of self-study.

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

General and Inorganic Chemistry A (780117P) and Introduction to Organic Chemistry (780116P). Student is allowed to participate to the course simultaneously when participating the prerequisites. Attendance at the lecture of Safety in laboratory is compulsory.

Recommended optional programme components:

Participation in the courses General and Inorganic Chemistry (780117P, 5 cr) and Introduction to Organic Chemistry (780116P, 5 cr).

Recommended or required reading:

Instruction Book (in Finnish)

Assessment methods and criteria:

Accomplishment of the course requires accepted preparatory problems, laboratory exercises and problems related to them.

Grading:

The course utilizes verbal grading scale pass/fail.

Person responsible:

Teija Kangas

Working life cooperation:

No

Other information:

Attendance at the lecture of Safety at work is compulsory.

781321A: Bachelor's Thesis, 8 op

Voimassaolo: 01.01.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
8 ECTS credits / 215 hours of work
Language of instruction:
Finnish, English on demand
Timing:
3rd autumn and 3rd spring
Learning outcomes:
After this course, the student
- can search scientific information from the chemistry literature
- He/she can estimate, structure and apply the information while writing a scientific report as well as preparing a poster and oral presentation
- can adapt the principles of the oral presentation for a talk and apply ethical principles for research and reporting
- can work in a group, present a poster or give a scientific talk for an audience.

Contents:
Chemistry literature, guidelines for good scientific practice and scientific writing. Preparation and presentation of a poster and seminar talk from the subject, which is related to the Bachelor’s thesis. The structure, content and preparation of the Bachelor’s thesis.
Mode of delivery:
Blended teaching
Learning activities and teaching methods:

10 h of the lectures, a poster seminar (3 h) and 10 h of online work and exercises. Independent work with the Bachelor Thesis. The attendance in the seminar talks of the fellow students and the student's own scientific presentation on a scientific subject related to the B.Sc. thesis (20 min.) during a spring term.

Target group:
Chemistry, Chemistry subject teacher, compulsory.

Prerequisites and co-requisites:
The first and second year courses in Chemistry.

Recommended optional programme components:
The course Information Search (030005P), 1 credit, has to be done during this course.

Recommended or required reading:
Lecture handout.

Assessment methods and criteria:
The preparation and introduction of a poster. The thesis of ca. 20 pages including ca. 20 references. The student gives a scientific presentation (20 min). The compulsory attendance at the lectures and seminars. The analysis of the student's own and fellow students' seminar talks. In addition, the student takes a maturity examination on the subject of the B.Sc. thesis.
Bachelor Thesis has to be upload to Laturi, when supervisor has approved it.

Grading:
The Poster: a verbal grading scale pass/fail.
The thesis and seminar talk are evaluated on a numerical grading scale 0-5. In the numerical scale zero stands for a fail.

Person responsible:
Lecturer Johanna Kärkkäinen. The Bachelor's thesis is supervised by Professors, Docents, University Lectures or Post-doctoral Researchers.

Working life cooperation:
No

Other information:
Enrolment for the course Information Search (030005P) is done through WebOod at the beginning of the course.

781301A: Inorganic Chemistry I, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

780353A	Inorganic Chemistry I	6.0 op
780356A	Inorganic Chemistry	9.0 op

ECTS Credits:
5 credits / 134 hours of work

Language of instruction:
Finnish

Timing:
2nd spring

Learning outcomes:
After this course the student is familiar with the most important basic principles of modern inorganic chemistry.

Contents:
Atomic structure, chemical bond and molecular structure, molecular symmetry, solid state chemistry, acid-base theories.

Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
38 hours of lectures, 10 hours of exercises, self-study 86 hours

Target group:
Chemistry, compulsory

Prerequisites and co-requisites:

General and Inorganic Chemistry A (780117P) and General and Inorganic Chemistry B (780118P) OR General and Inorganic Chemistry I (780114P) and General and Inorganic Chemistry II (780115P) or Introduction to Chemistry (780113P)

Recommended optional programme components:
The course is an independent entity and does not require additional studies carried out at the same time.

Recommended or required reading:
Weller, M., Overton, T., Rourke, J., and Armstrong, F.: Inorganic Chemistry, 7 th ed., Oxford University Press, Oxford 2018. Chapters 1-5, 8.

Assessment methods and criteria:
The assessment of the course is based on the final examination.
Read more about assessment criteria at the University of Oulu webpage.

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

Person responsible:
Raija Oilunkaniemi

Working life cooperation:
No

Other information:
No

781302A: Inorganic Chemistry II, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Raija Oilunkaniemi

Opintokohteen kielet: Finnish

Leikkaavuudet:

780391A	Inorganic Chemistry II	4.0 op
780356A	Inorganic Chemistry	9.0 op
781642S	Inorganic Chemistry II	4.0 op

ECTS Credits:
5 credits / 134 hours of work

Language of instruction:
Finnish/English on demand

Timing:
2nd spring

Learning outcomes:
After this course the student is familiar with basic concepts of coordination chemistry of transition metal complexes.

Contents:
Structure, bonding and reactions of complexes of transition metals and their chemical and spectroscopic properties, organometallic chemistry, catalysis.

Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
32 hours of lecture, 10 hours of exercises, self-study 92 hours

Target group:
Chemistry, compulsory

Prerequisites and co-requisites:
Inorganic Chemistry I (781301A) lectures

Recommended optional programme components:
The course is an independent entity and does not require additional studies carried out at the same time.

Recommended or required reading:
Weller, M., Overton, T., Rourke, J., and Armstrong, F.: Inorganic Chemistry, 7 th ed., Oxford University Press, Oxford 2018. Chapters 6, 7, 19-27.

Assessment methods and criteria:
The assessment of the course is based on the final examination.

Read more about assessment criteria at the University of Oulu webpage.
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:
Raija Oilunkaniemi
Working life cooperation:
No
Other information:
No

780354A: Laboratory Course I in Inorganic Chemistry, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 ECTS credits / 134 hours of work
Language of instruction:
Finnish
Timing:
2nd spring
Learning outcomes:
At the end of the course: the students should have acquired an understanding of:
- basic qualitative inorganic chemistry
- classical quantitative inorganic chemistry
- basic inorganic synthetic chemistry
- laboratory safety issues

Contents:
Water analysis, neutralization, synthesis and characterization of inorganic compound.
Mode of delivery:
Face-to-face teaching, compulsory
Learning activities and teaching methods:
80 hours of laboratory work, 54 hours of self-study.
Target group:
Chemistry, compulsory
Prerequisites and co-requisites:
General and Inorganic Chemistry A and B (780117P and 780118P), Introduction to Organic Chemistry (780103P or 780112P or 780116P). Introductory Laboratory Course in Chemistry (780122P or 780123P).
Recommended optional programme components:
The course is an independent entity and does not require additional studies carried out at the same time.
Recommended or required reading:
Material handed out in the laboratory
Assessment methods and criteria:
Works, reports and the final exam passed. The works must be done within the next two years.
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail. 75 % laboratory work and 25 % final examination.
Person responsible:
Matti Niemelä and Johanna Havia
Working life cooperation:
No
Other information:
Reports must be returned to the teaching assistants by the given deadline. Otherwise you have to do the work again.

781307A: Laboratory Course I in Organic Chemistry, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

780329A Laboratory Course I in Organic Chemistry 4.0 op

ECTS Credits:
5 ECTS credits / 134 hours of work
Language of instruction:
Finnish, English on demand, materials in English (partly)
Timing:
2nd autumn
Learning outcomes:
Upon completion of the five different syntheses of the course, the student is familiar with safety issues, glassware and equipment, use of laboratory notebook and reporting of laboratory experiments. He/she should be able to work by using basic techniques of organic chemistry such as distillation, extraction, crystallization, TLC.
Contents:
Different organic syntheses.
Mode of delivery:
Face-to-face teaching in the laboratory
Learning activities and teaching methods:
8 h lectures (obligatory for all), 50 h laboratory of supervised, independent laboratory work and 73 h self-study and reporting, seminar 3 h.
Target group:
Chemistry, compulsory
Prerequisites and co-requisites:
General and Inorganic Chemistry A and General and Inorganic Chemistry B (780117P and 780118P), Introduction to Organic Chemistry (780116P), and Introductory Laboratory Course (780123P/780127P) passed.
Or General and Inorganic Chemistry I and General and Inorganic Chemistry II (780114P and 780115P), or Introduction to Chemistry (780113P) or Introduction to Physical Chemistry (780101P) and Introduction to Inorganic Chemistry (780102P) or Basic Principles in Chemistry (780109P), Introduction to Organic Chemistry (780103P), and Introductory Laboratory Course (780122P or 780123P) passed.
Recommended optional programme components:
Participation in the course 781305A Organic Chemistry I.
Recommended or required reading:
Hart, H.: Organic Chemistry: A Short Course, 10. ed or newer, Houhgton Mifflin, Boston, 1999; Clayden, J., Greeves, N., Warren, S.: Organic Chemistry, Oxford University Press, 2. ed., 2012.
Assessment methods and criteria:
Syntheses, preliminary exercises, laboratory notebook, reports and the preliminary exam passed. The syntheses must be done within the next two years.
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:
Johanna Kärkkäinen
Working life cooperation:
No
Other information:
The reports must be returned to the teacher by the given deadline. Otherwise you have to do the work again.

780331A: Laboratory Course I in Physical Chemistry, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Anne Heponiemi

Opintokohteen kielet: Finnish

ECTS Credits:
5 credits / 134 hours of work
Language of instruction:
Finnish
Timing:
2 nd autumn
Learning outcomes:
Upon completion of the course: the student should have acquired an understanding of:

- laboratory safety issues
- basic physical chemistry experimental methods
- how to produce the laboratory report about the examined issue

Contents:
Calorimetric studies, distribution law, vapour pressure of solvent, partial mole volume, distillation of a mixture of liquids, crystallization of a liquid mixture, electromotive force.
Mode of delivery:
Face-to-face teaching. The course contains guided laboratory works, which include independently written laboratory reports from the works.
Learning activities and teaching methods:
2 hours lecture of laboratory safety at work (obligatory), 13 hours of preliminary exercises, 38 hours of laboratory experiments, written laboratory reports and independent work of student, 76 hours, final seminar 5 hours.
Target group:
Chemistry, compulsory
Prerequisites and co-requisites:
Courses General and Inorganic Chemistry A (780117P) and General and Inorganic Chemistry B (780118P) OR Courses General and Inorganic Chemistry I (780114P) and General and Inorganic Chemistry II (780115P), and Introductory Laboratory Works in Chemistry (780122P or 780123P) passed.
Recommended optional programme components:
Courses General and Inorganic Chemistry A (780117P) and General and Inorganic Chemistry B (780118P) OR Courses General and Inorganic Chemistry I (780114P) and General and Inorganic Chemistry II (780115P), and Introductory Laboratory Works in Chemistry (780122P or 780123P), Physical Chemistry I 781303A.
Recommended or required reading:
Practical work handout; Atkins, P. W.: Physical Chemistry, 10 th ed., Oxford University Press, 2014, partly. Or an older editions.
Assessment methods and criteria:
Preliminary exercises, laboratory works and reports passed. The works must be done within the next two years. Read more about assessment criteria at the University of Oulu webpage.
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:
Anne Heponiemi
Working life cooperation:
No
Other information:
Reports must be returned to the teachers by the given deadline. Otherwise the work have to be done again.

780381A: Maturity test, 0 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
0 credits / 3 hours of work
Language of instruction:
Finnish (Swedish or English)
Timing:
3 rd spring
Learning outcomes:

Upon completion the maturity test the student has shown thar he/she can descibe his/her research topic in a logical and crispy way using scientific terminology typical to chemistry.
Contents:
An essay-type test of the topic the B.Sc. Thesis. The maturity test is a test for the language skill and for the knowledge of the research topic.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Writing an essay of the topic of the thesis, 3 hours work
Target group:
Chemistry, compulsory
Prerequisites and co-requisites:
The B.Sc. Thesis
Recommended optional programme components:
The course is an independent entity and does not require additional studies carried out at the same time.
Recommended or required reading:
The B.Sc. Thesis
Assessment methods and criteria:
The writing of the maturity test is agreed with the supervisor.
Grading:
The course utilizes verbal grading scale pass/fail.
Person responsible:
Professors, Docents, Lectures, Doctor level researchers of the Chemistry Department
Working life cooperation:
No
Other information:
No

781305A: Organic Chemistry I, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

780389A	Organic Chemistry I	6.0 op
780385A	Organic Chemistry I	9.0 op

ECTS Credits:
5 ECTS credits / 134 hours of work
Language of instruction:
Finnish
Timing:
2nd autumn
Learning outcomes:
After passing the course the student can explain the basics in molecular orbitals in simple organic compounds such as ethane, details in nucleophilic substitution, conformation and the basics in stereochemistry of organic compounds.
Contents:
Including molecular orbitals in organic compounds, conformation theory, nucleophilic substitution and basics of stereochemistry.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
40 hours of lectures, 94 hours self study
Target group:
Chemistry, compulsory. In the entity of 60 credits, compulsory.
Prerequisites and co-requisites:

Introduction to Organic Chemistry (780103P or 780116P) and the courses General and Inorganic Chemistry A (780117P) and General and Inorganic Chemistry B (780118P); or the courses General and Inorganic Chemistry I (780114P) and General and Inorganic Chemistry II (780115P); OR Introduction to Chemistry (780113P) or Introduction to Physical Chemistry (780101P).
Recommended optional programme components:
The course is an independent entity and does not require additional studies carried out at the same time.
Recommended or required reading:
Clayden, J., Greeves, N., Warren, S., Wothers, P.: Organic Chemistry, Oxford University Press, 2001 and Clayden, J., Greeves, N., Warren, S.: Organic Chemistry, Oxford University Press, 2nd Edition, 2012.
Assessment methods and criteria:
Two intermediate examinations or one final examination.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:
Juha Heiskanen
Working life cooperation:
No

781306A: Organic Chemistry II, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

780393A	Organic Chemistry II	4.0 op
780386A	Organic Chemistry II	9.0 op
783643S	Organic Chemistry II	4.0 op

ECTS Credits:
5 ECTS credits / 134 hours of work
Language of instruction:
Finnish/English on demand
Timing:
2nd spring
Learning outcomes:
After this course, the student can profoundly explain and analyze mechanisms of various organic chemistry reactions and predict reaction outcome.
Contents:
Eliminations, addition to alkenes, Diels-Alder reactions, chemistry of aromatic heterocycles, formation of enols and enolates and their reactions.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
38 hours of lectures, 96 hours of self study
Target group:
Chemistry, compulsory
Prerequisites and co-requisites:
Organic Chemistry I (781305A)
Recommended optional programme components:
The course is an independent entity and does not require additional studies carried out at the same time.
Recommended or required reading:
Lecture material and Clayden, J., Greeves, N., Warren, S., Wothers, P.: Organic Chemistry, Oxford University Press, 2001 and Clayden, J., Greeves, N., Warren, S.: Organic Chemistry, 2nd edition, Oxford University Press, 2012.
Assessment methods and criteria:
Final examination.
Read more about assessment criteria at the University of Oulu webpage.

Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:
Juha Heiskanen
Working life cooperation:
No

781303A: Physical Chemistry I, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

780347A	Physical Chemistry I	6.0 op
780318A	Physical Chemistry II	6.5 op

ECTS Credits:
5 ECTS credits
Language of instruction:
Lectures are given in Finnish. The examinations can be arranged in english and the textbook helps studying in english.
Timing:
The course is held in the spring semester. It is recommended to complete the course at the 1st spring semester.
Learning outcomes:
Upon completion the student should be able to display an understanding of the main topics of chemical thermodynamics and kinetics. During the course such concepts are introduced that are needed for the discussion of equilibria in chemistry. Much emphasis is in enthalpy, entropy and Gibbs energy. A unified view of equilibrium and the directions of spontaneous change are obtained in terms of chemical potentials of substances.
Contents:
PART I, “Equilibrium” from the textbook.
Mode of delivery:
Lectures and excercises.
Learning activities and teaching methods:
48 h lectures, 12 h excercises
Target group:
Chemistry, Chemistry teacher
Recommended optional programme components:
The course is an independent entity and does not require additional studies carried out at the same time.
Recommended or required reading:
Atkins’ Physical Chemistry, 8th Edition (or any other edition)
Assessment methods and criteria:
Examinations are based on the textbook
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:
Jouni Pursiainen
Working life cooperation:
The course does not contain direct working life cooperation.

781304A: Physical Chemistry II, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Pursiainen Jouni

Opintokohteen kielet: Finnish

Leikkaavuudet:

780392A	Physical Chemistry II	4.0 op
780319A	Physical Chemistry III	6.5 op
782631S	Physical Chemistry II	4.0 op

ECTS Credits:
5 ECTS credits
Language of instruction:
Lectures are given in Finnish. The examinations can be arranged in english and the textbook helps studying in english.
Timing:
The course is held in the autumn semester. It is recommended to complete the course at the 2nd autumn semester.
Learning outcomes:
Upon completion the student should be able to display an understanding of the main topics molecular motion, kinetics, reaction dynamics and solid surfaces.
Contents:
Atkins' textbook, chapters 21-25.
Mode of delivery:
Lectures and excercises.
Learning activities and teaching methods:
32 h lectures, 10 h excercises.
Target group:
Chemistry, Chemistry teacher
Recommended optional programme components:
The course is an independent entity and does not require additional studies carried out at the same time.
Recommended or required reading:
Atkins' Physical Chemistry, 8th Edition (or any other edition).
Assessment methods and criteria:
Examinations are based on the textbook.
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:
Jouni Pursiainen
Working life cooperation:
The course does not contain direct working life cooperation.

780301A: Research Training, 9 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Anne Heponiemi, Juha Heiskanen, Matti Niemelä

Opintokohteen kielet: Finnish

ECTS Credits:
9 ECTS credits / 240 hours of work
Language of instruction:
Finnish, English on demand, materials in English (partly).
Timing:
3 rd autumn-spring
Learning outcomes:
Inorganic chemistry: After completing this course, the student should be able to work independently in the laboratory and have ability to write a scientific report.
Physical Chemistry:
Upon completion of the course the student should have acquired an understanding of:

- laboratory safety issues
- how to perform physical chemistry experiments independently
- how to produce the scientific laboratory report about the examined issue

Organic chemistry: After completing this course, the student is able to carry out laboratory scale syntheses, document the stages of work and write a scientific report.
Contents:
in Inorganic Chemistry: Three laboratory projects on different fields of inorganic chemistry: ICP-OES-analysis, protonation constant, XRD experiment. Additionally, written laboratory reports, one per practical.
in Physical Chemistry: Bomb calorimetric study, conductivity of an electrolytic solution, rate of chemical reaction, adsorption of solution, surface tension.
in Organic Chemistry: Four synthetic exercises. Basics of FTIR and ^{1}H NMR analytical methods.
Additionally, written laboratory reports, one per practical.
Mode of delivery:
Supervised laboratory works
Learning activities and teaching methods:
240 hours of laboratory works and reports (80 h/laboratory). See more detailed information from description each of module 780301A-01, 780301A-02 and 780301A-03.
Target group:
Chemistry, compulsory
Prerequisites and co-requisites:
The compulsory courses of chemistry in the first and second year.
Recommended optional programme components:
The course is an independent entity and does not require additional studies carried out at the same time.

Recommended or required reading:
Working instructions
Assessment methods and criteria:
Laboratory works and reports passed.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:
Matti Niemelä, Johanna Havia, Raija Oilunkaniemi, Anne Heponiemi, Juha Heiskanen
Working life cooperation:
No
Other information:
The reports must be returned by the given deadline, otherwise the work has to be done again.

802354A: Basics in Algebra, 5 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Myllylä

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay802354A	Number Theory and Groups (OPEN UNI)	5.0 op
800333A	Algebra I	8.0 op

ECTS Credits:
5 ECTS credits
Language of instruction:
Finnish
Timing:
1. year, 3. period
Learning outcomes:
After completing the course, student is able to:

- derive and proof main results in the course

- use and apply different proof techniques
- recognize algebraic structures and the concepts
- see connections and differences between different algebraic structures

Contents:
The course includes basics in arithmetics and algebraic structures, such as, congruence, residue classes, prime numbres, Euclidean algorithm, the fundamental theorem of arithmetic, Euler-Fermat formula, groups and morphisms. The course gives an understanding of
algebraic terms and concepts used in mathematics and physics.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
28 h lectures, 14 h exercises
Target group:
Major and minor students
Prerequisites and co-requisites:
802151P Introduction to mathematical deduction
Recommended optional programme components:
-
Recommended or required reading:
Lecture notes
Assessment methods and criteria:
Final exam
Grading:
1-5, fail
Person responsible:
Kari Myllylä
Working life cooperation:
-

800317A: Continuity and derivative, 5 op

Voimassaolo: 01.01.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

802163P	Derivative	5.0 op
802156P	Derivative	4.0 op

ECTS Credits:
5 ECTS credits / 133 hours of work
Language of instruction:
Finnish
Timing:
1st year, 2nd period
Learning outcomes:
Upon completing the course the student is:
- able to define the concept of continuous function and apply this definition in examples and deductions
- able to determine derivatives of functions
- able to apply derivative to study functions
- able to appy the concepts of continuity and derivative in various problems, including deductions

Contents:
The course concerns continuity and derivative of real-valued functions of one variable. The central topics are the intermediate value theorem, the chain rule, the derivative of inverse functions, the mean value theorem and its applications. Differential calculus is also applied to various problems. The aim of the course is to improve mathematical thinking as well as computational skills.
Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
28 h lectures, 14 h exercises, 91 h independent study
Target group:
1st year mathematics and physics students as well as students taking mathematics as a minor subject
Prerequisites and co-requisites:
Functions and limit 800119P, Introduction to mathematical deduction 802151P
Recommended optional programme components:
-
Recommended or required reading:
In addition to the material hand out in the course, for example the book P. Harjulehto, R. Klén, M. Koskenoja, Analyysiä reaaliluvuilla.
Assessment methods and criteria:
Final exam, exercises
Grading:
1-5, fail
Person responsible:
Esa Järvenpää
Working life cooperation:
No
Other information:
Replaces the course 802163P Derivative.

800119P: Functions and limit, 5 op

Voimassaolo: 01.01.2017 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opettajat: Pekka Salmi

Opintokohteen kielet: Finnish

Leikkaavuudet:

802162P	Continuity and Limit	5.0 op
802155P	Continuity and limit	4.0 op

ECTS Credits:
5 ECTS credits / 133 hours of work
Language of instruction:
Finnish
Timing:
1st year, 1st period
Learning outcomes:
Upon completing the course the student is:
- able to apply the triangle inequality and make approximations
- able to manipulate elementary functions such as polynomials and trigonometric functions
- able to define the limit of a sequence and the limit of a function as well as apply these definitions
- able to apply different techniques to determine limits.

Contents:
The course concerns real-valued functions of one variable. In particular elementary functions are defined and the monotonicity of functions is studied. The notion of absolute value is reviewed and applied to approximation. Also the triangle inequality is used in approximation. The central concept is the limit of a function, which is introduced via the limit of a sequence. The aim of the course is to improve deductive skills as well as computational skills.
Mode of delivery:
Face-to-face teaching, (computer exercises)
Learning activities and teaching methods:
28 h lectures, 14 h exercises, 91 h independent study
Target group:
1st year mathematics and physics students as well as students taking mathematics as a minor subject
Prerequisites and co-requisites:
Introduction to mathematical deduction 802151P is recommended to be taken simultaneously (or earlier).

Recommended optional programme components:
-
Recommended or required reading:
Lecture notes, (STACK exercises).
Additional material: for example the book P. Harjulehto, R. Klén, M. Koskenoja, Analyysiä reaaliluvuilla.
Assessment methods and criteria:
Final exam, exercises
Grading:
1-5, fail
Person responsible:
Pekka Salmi
Working life cooperation:
No
Other information:
Replaces the course 802162P Continuity and Limit.

800318A: Integral, 5 op

Voimassaolo: 01.01.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opettajat: Ville Suomala

Opintokohteen kielet: Finnish

Leikkaavuudet:

802164P	Series and Integral	5.0 op
802353A	Series and Integrals	6.0 op

ECTS Credits:
5 ECTS credits / 133 hours of work
Language of instruction:
Finnish
Timing:
1st year 3rd period
Learning outcomes:
After completing the course, the student:
- manages the basics of integration theory
- understands the connection and differences between definite and indefinite integral
- is able to understand the connetcion between the integral and the derivative
- is able to use appropriate integration methods and knows where integration theory is applied
Contents:
Introduction to integration theory. Riemann-integral, The fundamental theorem of Calculus, Eksponent function and logarithm, integration by parts, integration by substitution, improper integral. Applications of integration theory.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 28 h, exercises 14 h, independent work
Target group:
1st year mathematics and physics students as well as students taking mathematics as a minor subject
Prerequisites and co-requisites:
Functions and limit, Continuity and derivative
Recommended or required reading:
In addition to the material hand out in the course, for example the book P. Harjulehto, R. Klén, M. Koskenoja, Analyysiä reaaliluvuilla.
Assessment methods and criteria:
Final exam
Grading:
1-5, fail
Person responsible:

Ville Suomala
Working life cooperation:
no
Other information:
Replaces the course 802164P Series and integral.

802120P: Introduction to Matrices, 5 op

Voimassaolo: 01.06.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

802118P Linear Algebra I 4.0 op

ECTS Credits:
5 ECTS credits
Language of instruction:
Finnish
Timing:
1. year, 4. period
Learning outcomes:
After completing the course the student is able to:
- apply arithmetic operations of matrices
- solve system of linear equations by matrix methods
- study linear depence and linear indepence of vectors
- recognize the subspace of R^n and understands the concepts of basis and dimension of a vector space
- analyse matrices by the parameters and the vectors
Contents:
Vectors and matrices, Systems of linear equations, determinant of a matrix, subspaces of R^n, linear depence and linear indepence of vectors, base, dimension, eigenvalues and eigenvectors of a matrix, diagonalization, LU - factorization of a matrix.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 28 h, Exercises 14 h
Target group:
Major and minor studies
Prerequisites and co-requisites:
802151P Introduction to Mathematical Deduction
Recommended or required reading:
Lecture notes.
Grossman, S.I. : Elementary Linear Algebra, David C. Lay: Linear Algebra and Its Applications.
Assessment methods and criteria:
Final exam
Grading:
Fail, 1-5
Person responsible:
Marko Leinonen
Working life cooperation:
-

806113P: Introduction to Statistics, 5 op

Voimassaolo: 01.01.2011 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opettajat: Hanna Heikkinen

Opintokohteen oppimateriaali:
Wild, Christopher J. , , 2000
Grönroos, Matti (2) , , 2003

Opintokohteen kielet: Finnish

Leikkaavuudet:

806118P	Introduction to Statistics	5.0 op
806119P	A Second Course in Statistics	5.0 op
806116P	Statistics for Economic Sciences	5.0 op

ECTS Credits:
5 ECTS credits
Language of instruction:
Finnish
Timing:
4th period. Students of mathematics and physics: 1st year of studies.
Learning outcomes:
Upon completion of the course, student will be:
- able to identify and define the main principles of statistical research, collection of the data and analysis
- able to apply basic methods of descriptive statistics and statistical inference in simple quantitative research using a statistical software
- able to critically evaluate results of the statistical research presented in media
- prepared for teaching statistics in secondary school and high school
- prepared for participating in a group.

Contents:
- the nature and the meaning of statistics
- data and the acquisition of them: observations, variables, measuring and designs of a study
- the descriptive statistics of empirical distributions: tables, graphical presentations and descriptive measures of center, variation and dependence
- the most important probability distributions
- the principles and the basic methods of statistical inference: random sample, sample statistics, point estimation, confidence intervals and statistical testing of hypotheses.

Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 16 h, instructed group work 26-28 h, independent study 89 h. Groups return their group tasks. Additional independently implemented learning tasks. Independent study includes also preparation for group work.
Target group:
Students of mathematical and physical sciences. Students of other degree programmes: 806118P, 806119P
Prerequisites and co-requisites:
The recommended prerequisite prior to enrolling for the course is the completion of the courses: 802151P Introduction to mathematical deduction and 800119P Functions and limit.

Recommended optional programme components:
After the course, student is able to continue other statistics courses.
Recommended or required reading:
Lecture notes.
Assessment methods and criteria:
This course utilizes continuous assessment. Practical works and learning tasks (including e.g. learning diaries and web tests) are assessed weekly. The assessment of the course is based on the learning outcomes of the course. The more detailed assessment criteria will be available in the beginning of the course.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.
Person responsible:
Hanna Heikkinen
Working life cooperation:
No

802151P: Introduction to mathematical deduction, 5 op

Voimassaolo: 01.08.2009 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay802151P	Introduction to mathematical deduction (OPEN UNI)	5.0 op

ECTS Credits:
5 ECTS credits
Language of instruction:
Finnish
Timing:
First period at the first semester.
Learning outcomes:
After completing the course, the student:
- is able to understand different proving techniques
- is able to evaluate and justify whether simple statements are true or false
- is able to understand and read text containing mathematical notation
- knows the basic definitions and concepts related to set theory and functions

Contents:
The course in an introduction to mathematical deduction and introduces different types of proof techniques. Special attention is paid to mathematical reading and writing skills and justifying reasoning. Main concepts in this course are basic set theory and functions.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 28 h, exercises 14 h
Target group:
Major and minor students
Prerequisites and co-requisites:
-
Recommended optional programme components:
-
Recommended or required reading:
Lecture notes
Assessment methods and criteria:
Exercises and final exam.
Grading:
Pass/Fail
Person responsible:
Topi Törmä
Working life cooperation:
No

802320A: Linear Algebra, 5 op

Voimassaolo: 01.06.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opettajat: Pekka Salmi

Opintokohteen kielet: Finnish

Leikkaavuudet:

802119P Linear Algebra II 5.0 op

ECTS Credits:
5 ECTS credits
Language of instruction:
Finnish and English
Timing:
2nd year, 3rd 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:
-
Assessment methods and criteria:
Final exam
Grading:
1-5, fail
Person responsible:
Pekka Salmi
Working life cooperation:
No

801195P: Probability Theory, 5 op

Voimassaolo: 01.01.2011 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 ECTS credits
Language of instruction:
Finnish
Timing:
2nd year, 2nd period.
Learning outcomes:
Upon completing the course the student will be able to:
- solve simple practical problems associated with probability
- solve simple theoretical problems associated with probability
- derive the basic properties of probability, starting from the axioms

Contents:
The course is an introduction to probability. In the beginning high school level probability is reviewed and after that axiomatic treatment of the theory starts. The central concepts discussed include probability space, conditional probability, independence, and random variable together with its distribution and expected value.

Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
28 h of lectures, 14 h of exercises, 91 h of independent study
Target group:
Mathematics majors and minors
Prerequisites and co-requisites:
Integral 800318A
Recommended optional programme components:
-
Recommended or required reading:
Lectures.
Text book: Pekka Tuominen: Todennäköisyyslaskenta I, Limes ry, Helsinki.
Assessment methods and criteria:
Mid-term exams and/or final exam. Active participation in the course.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.
Person responsible:
Hanna Heikkinen
Working life cooperation:
-

761313A: Atomic physics 1, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opettajat: Saana-Maija Aho

Opintokohteen kielet: Finnish

Leikkaavuudet:

766326A	Atomic physics 1	6.0 op

ECTS Credits:
5 ECTS credits
Language of instruction:
Finnish
Timing:
Second autumn term
Learning outcomes:
Student can explain the development of the atomic model. Student is able to describe some interaction mechanisms of electromagnetic radiation and matter. Student can resolve easy quantum mechanical problems. Student can describe the principles used when the wave functions and energies of some simple systems are determined. Student can take advantage of the periodic table of elements in finding the chemical and physical properties of atoms based on its electronic structure.
Contents:
In the beginning of the course, the historical events which led to the development of the quantum mechanics and the modern atomic model in the early 20th century are discussed. In this context, the interaction processes between matter and electromagnetic radiation, like black-body radiation, the photoelectric effect, and scattering, are examined. In quantum mechanics, particles are usually described with the aid of wave functions. De Broglie wavelength, the group and phase velocities of particles, and Heisenberg uncertainty principle serve as an introduction to the wave properties of particles. The Bohr's atomic model, electronic transitions of atoms, and emission spectra of atoms are also discussed. The first touch to the quantum mechanics is the solutions of wave functions and energies for some simple systems, like hydrogen atom, are described. Additionally, many-electron atoms are discussed briefly. Some modern research methods which are used to study the atomic physics are introduced. Applications which exploit the atom physical phenomena in everyday life are also discussed.
Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
Lectures 28 h, 7 exercises, self-study 90 h
Target group:
No specific target qroup
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:
Books: A. Beiser: Concepts of Modern Physics, McGraw-Hill Inc.
Assessment methods and criteria:
Group or individual excercises, webexcercises or final exam.
Grading:
Numerical grading scale 0 – 5, where 0 = fail
Person responsible:
Saana-Maija Huttula
Working life cooperation:
No work placement period

761119P: Electromagnetism 1, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opettajat: Timo Asikainen

Opintokohteen kielet: Finnish

Leikkaavuudet:

761113P-01	Electricity and magnetism, lectures and exam	0.0 op
761113P-02	Electricity and magnetism, lab. exercises	0.0 op
761113P	Electricity and magnetism	5.0 op
766319A	Electromagnetism	7.0 op
761103P	Electricity and Magnetism	4.0 op

ECTS Credits:
5 ECTS credits / 133 hours of work
- 761119P-01, Lectures and exam (4 cr)
- 761119P-02, Lab. exercises (1 cr)
Language of instruction:
Finnish
Timing:
Second fall term
Learning outcomes:
The student will be able to understand the basic concepts of electromagnetism and can apply this understanding to solve problems related to electromagnetism.
Contents:
Basic principles of electromagnetic phenomena and their physical and geometric interpretation. More detailed contents will be presented later.
Mode of delivery:
face-to-face teaching
Learning activities and teaching methods:
Lectures 32 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, 13. ed., chapters 21-31. Also other editions can be used. Lecture material in finnish.
Assessment methods and criteria:
Both parts (761119P-01 and 761119P-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).
761119P-01: Three small midterm exams or final examination
761119P-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:
Timo Asikainen

761312A: Electromagnetism 2, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

766319A	Electromagnetism	7.0 op

ECTS Credits:
5 ECTS credits / 133 hours of work
Language of instruction:
Finnish
Timing:
Second spring term
Learning outcomes:
The student will be able to derive the individual results like electric fields produced by charge distributions, magnetic field by current systems and solve problems related to electromagnetic induction. The student can derive the wave equation for electromagnetic waves.
Contents:
The foundations of the electromagnetic field theory. Exact contents to be specified later.
Mode of delivery:
face-to-face teaching
Grading:
Numerical grading scale 0 – 5, where 0 = fail
Person responsible:
Anita Aikio

761115P: Laboratory Exercises in Physics 1, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opettajat: Lauri Hautala

Opintokohteen kielet: Finnish

Leikkaavuudet:

761121P	Physical Measurements I	3.0 op
761121P-01	Physical measurements I, exam	0.0 op
761121P-02	Physical measurements I, lab. exercises	0.0 op

800149P Introduction to LateX 2.0 op

ECTS Credits:
5 ECTS credits / 135 hours of work
Language of instruction:
Finnish
Timing:
Spring term, periods 3 and 4
Learning outcomes:
The student can safely make physical measurements, use basic measurement tools, read different scales, handle the data, calculate the error estimations and make a sensible report of the laboratory measurements.
Contents:
The skill of measuring is important for physicists. This is an introductory course on how to make physical measurements and how to treat the measured data. Laboratory works are made in groups. Laboratory safety is also an essential part of physical measurements. Measurements are made with different instruments. As a result, the most probable value is determined as well as its error. The skills obtained during this course can be applied in the subsequent laboratory courses Laboratory exercises in physics 2 and 3.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
12 hours of lectures, 16 hours of exercises, 107 hours of self-study.
Target group:
Students in physics degree program. Other students studying in University of Oulu can also participate to the course.
Prerequisites and co-requisites:
No specific prerequisites.
Recommended optional programme components:
The course is an independent entity and does not require additional studies carried out at the same time.
Recommended or required reading:
Study material will be announced at the beginning of the course.
Assessment methods and criteria:
The assessment is performed using exercises to be completed during the course. Further instructions will be given at the beginning of the course.
Grading:
The course utilizes a numerical grading scale 0-5 where zero stands for a fail.
Person responsible:
Lauri Hautala
Working life cooperation:
The course does not contain working life cooperation.
Other information:
Timetables, further instructions and materials can be found from the course website in Moodle (moodle.oulu.fi).

Compulsory

761115P-01: Laboratory Exercises in Physics 1, lecture and exam, 0 op

Voimassaolo: 01.01.2017 -
Opiskelumuoto: Basic Studies
Laji: Partial credit
Vastuuyksikkö: Field of Physics
Arvostelu: 1 - 5, pass, fail
Opettajat: Lauri Hautala
Opintokohteen kielet: Finnish
Leikkaavuudet:

761121P-01 Physical measurements I, exam 0.0 op
761121P-02 Physical measurements I, lab. exercises 0.0 op
761121P Physical Measurements I 3.0 op

Ei opintojaksokuvauksia.

761115P-02: Laboratory Exercises in Physics 1, laboratory exercises, 0 op

Voimassaolo: 01.01.2017 -
Opiskelumuoto: Basic Studies
Laji: Partial credit
Vastuuyksikkö: Field of Physics
Arvostelu: 1 - 5, pass, fail
Opettajat: Lauri Hautala
Opintokohteen kielet: Finnish
Leikkaavuudet:

761121P-01 Physical measurements I, exam 0.0 op
761121P-02 Physical measurements I, lab. exercises 0.0 op
761121P Physical Measurements I 3.0 op

Ei opintojaksokuvauksia.

761120P: Laboratory Exercises in Physics 2, 5 op

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Field of Physics
Arvostelu: 1 - 5, pass, fail
Opettajat: Lauri Hautala
Opintokohteen kielet: Finnish
Leikkaavuudet:

766106P Laboratory exercises in physics 2 4.0 op

ECTS Credits:
5 ECTS credits / 133 hours of work
Language of instruction:
Finnish
Timing:
1. spring - 3. autumn
Learning outcomes:
After completing the course, the student can rather independently work with the most important measuring instruments used in physics and has experience in planning and conducting different measurements. The student is also able to critically assess her/his own results and report them to a group of peers.
Contents:
The laboratory exercises (0,5 ECTS per exercise) train the student in applying measurements to research into different physical phenomena. The exercises include practising how to plan the measurements, learning how to use the measuring instruments, processing and assessing the results, and drawing up scientific reports. Some of the exercises can be chosen according to the student´s own interest.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Per one exercise, 4 h of measurements in the laboratory and 5-9 h of preparation and drawing up a report independently.
Target group:
No specific target qroup
Prerequisites and co-requisites:
Recommended: 761121P/761115P Laboratory exercises in physics 1.
Recommended optional programme components:
Each exercise is closely related to a basic or intermediate course in physics, because the phenomena connected to the measurements and their theory are discussed in the lectures for the courses.
Recommended or required reading:
The exercise work instructions and guidelines for the work report, which can be found on the website of the course.
Assessment methods and criteria:

Adequate familiarization with the phenomenon under scrutiny and the measurements before the exercise (oral or written questions), successfully completing the guided measurements, reporting on the exercise (the work report will be graded).
Grading:
Numerical grading scale 0 – 5, where 0 = fail
Person responsible:
Lauri Hautala
Working life cooperation:
No work placement period
Other information:
Moodle

761118P: Mechanics 1, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opettajat: Aku Venhola

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 2-14. Also older and newer 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: Two midterm exams or final examination
761118P-02: Two laboratory exercises.

Grading:
Numerical grading scale 0 – 5, where 0 = fail

Person responsible:
Aku Venhola

Working life cooperation:
No work placement period

766344A: Nuclear and particle physics, 5 op

Voimassaolo: 01.12.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

766330A-01	Structure of matter, part 1: Solid state physics	0.0 op
766330A-02	Structure of matter, part 2: Nuclear and particle physics	0.0 op
766334A	Structure of matter II	2.0 op

ECTS Credits:
5 ECTS credits / 135 hours of work

Language of instruction:
Language of instruction is Finnish, but the exam and exercises can be done in English if agreed with the lecturer.

Timing:
The course is held in the spring semester during the 4th period. It is recommended to complete the course at the second spring semester.

Learning outcomes:
The student knows structure models and key properties of atomic nuclei, the most important ways in which the nuclei undergo radioactive decay, and is familiar with some technological applications based on nuclear properties and radioactivity.
The student is familiar with fission and fusion reactions and how they can be exploited in energy production.
The student knows the standard model classification of elementary particles, their properties and interactions.
The student can explain main principles of particle accelerators and detectors, and how they are used in research.

Contents:
The structure and properties of nuclei, nuclear forces, nuclear models, radioactivity, nuclear reactions, properties and interactions of elementary particles.

Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
Lectures 32 h (of which 4 h can be reserved for 2 mid-term exams), 8 exercises (16 h), self-study 87 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:
Atomic physics 1 (761313A), Electromagnetism 1 (761119P). Supporting courses Electromagnetism 2 (761312A) and Solid state physics (763343A).

Recommended optional programme components:
No alternative course units or course units that should be completed simultaneously

Recommended or required reading:
A. Beiser: Concepts of Modern Physics, McGraw-Hill Inc.

Assessment methods and criteria:
Final examination or two intermediate exams.
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:
Minna Patanen
Working life cooperation:
The course does not contain working life cooperation.
Other information:
The web page of the course in Moodle

761108P: Physical world view, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

761112P Physical world view 3.0 op

ECTS Credits:
5 ECTS credits / 133 hours of work
Language of instruction:
Finnish
Timing:
Autumn
Learning outcomes:
After the course student can see the position of physics in the advancement of scientific world view and technology. The student has a comprehensive view of different learning and studying methods (s)he can use later on.
Contents:
The forming of key concepts in physics, using models and observations in advancing both classical and modern physics. The meaning of applying physics in modern society. Getting to know different areas of physics research and employment opportunities for physicists.
Mode of delivery:
Multiform teaching
Learning activities and teaching methods:
48 h face-to-face teaching, 85 h independent work including course work and group work
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:
Feynman, R. The Character of Physical Law, Penguin Books 1992 (or equivalent, there are several prints). The original Massenger Lectures by Richard Fenyman in 1965 (7x55min) can be found online with search "Richard Feynman messenger lectures".
Assessment methods and criteria:
Passed course work or final exam
Grading:
Numerical grading scale 0-5, where 0 = fail
Person responsible:
Pauli Väisänen
Working life cooperation:
No work placement period

761314A: Thermophysics, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opettajat: Perttu Lantto

Opintokohteen kielet: Finnish

Leikkaavuudet:

766348A	Thermophysics	7.0 op
766328A	Thermophysics	6.0 op
761328A	Thermophysics	4.0 op

ECTS Credits:
5 ECTS credits / 133 hours of work
Language of instruction:
Finnish
Timing:
Third autumn semester
Learning outcomes:
The student can explain the basic concepts of thermophysics and can show how the following results (see Contents) arise from them at the level they are presented in lectures. In addition, the student can solve such problems that necessitate deep understanding of the content represented in the course.
Contents:
The goal of the course is to explain how the macroscopic thermophysical properties of a system (e.g., equation of state) can be derived from its fundamental microscopic properties (e.g., from the behavior of the molecules). For this purpose, the students are given a physically clear understanding of the basic principles of thermophysics, recognizing the fundamental role of its statistical nature. Topics will include: Basic concepts, The first law, Thermal expansion, heat transfer, and diffusion, The second law, The combined law, Heat engines and refrigerators, Thermodynamic potentials, Phases of matter, Classical ideal gas, Classical and open systems.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
14 lectures (28 h), 7 exercises (14 h), self-study 91 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:
Textbooks: H. D. Young and R. A. Freedman: University Physics, 13th edition, Pearson Addison-Wesley, 2012, or earlier editions (in part), F. Mandl: Statistical Physics, second edition, John Wiley & Sons Ltd., 1988 (in part).
Lecture notes: Juhani Lounila: 766328A Termofysiikka, Oulun yliopisto, 2016.
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:
Perttu Lantto
Working life cooperation:
No work placement period

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

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 qroup
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

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

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Proficiency level:
B2-C1

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

Faculty of Natural Sciences
- Biology
- Mathematical and Physical Sciences.

Faculty of Technology
- Chemistry
- Geosciences.

Note:
Please consult your faculty's Study Guide to establish the language requirements for your own degree program.

Required proficiency level:
English must have been the A1 or A2 language at school, or equivalent skills in English must have been otherwise acquired. If you need to take English, but lack the background, please get in touch with the Languages and Communication contact teacher to discuss individual solutions.

ECTS Credits:
2 ECTS / 53 hours of work

Language of instruction:
English

Timing:
Biology: 1st year spring term (periods 3 and 4)
Mathematical and Physical Sciences: 1st year autumn term (periods 1 and 2)
Chemistry: 1st year autumn term (periods 1 and 2)
Geosciences: 1st year spring term (periods 3 and 4)

Learning outcomes:
By the end of the course, you are expected to demonstrate the ability to:
utilize your knowledge of word formation, text structure, and cohesion markers to understand the vocabulary and content of academic texts,
use effective reading strategies and techniques for studying vocabulary, and
summarize texts both orally or in writing.

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

Mode of delivery:
The course is implemented using blended methods, which may include web-based teaching and face-to-face teaching. The course utilizes the Moodle learning environment.

Learning activities and teaching methods:
The English 1 course is adapted to accommodate many different fields of study, and thus the materials and implementation methods of the course vary. There will be 26 hours of guided teaching events and 28 hours of independent study, either individually or in a group.

Target group:
Faculty of Natural Sciences:1st-year students of Biology, Mathematical & Physical Sciences
Faculty of Technology: 1st-year students of Chemistry, Geosciences

Prerequisites and co-requisites:
Post-requisite Students are also required to take English 2 902004Y following completion of this course.

Recommended optional programme components:
None

Recommended or required reading:
Course materials used will be available from the library or online.

Assessment methods and criteria:
Continuous assessment takes into account active and regular participation in classroom sessions and successful completion of all homework tasks, There are three monthly tests on material covered so far. The assessment of the course is based on the learning outcomes listed above.

Grading:
The course utilises a grading scale of Pass/Fail.
Person responsible:
Karen Niskanen
Working life cooperation:
The course does not contain working life cooperation.
Other information:
N.B. Students with grades laudatur or eximia in their A1 English school-leaving examination can be exempted from this course and will be granted the credits by your faculty. Contact the faculty for information.

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

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Leikkaavuudet:

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

Proficiency level:
B2 - C1
Status:
This course is mandatory for students who choose English as their foreign language in the following B.Sc. degree programs:
Faculty of Natural Sciences:
Biology
Mathematical & Physical Sciences.
Faculty of Technology:
Chemistry
Geoscience.

Required proficiency level:
Students taking this course must have had English as the A1 or A2 language at school or have equivalent skills.
ECTS Credits:
2 ECTS credits / 53 hours of work.
Language of instruction:
English
Timing:
Biology: 2nd year autumn term (periods 1 and 2)
Mathematic and Physical Sciences 1st year spring term (periods 3 and 4)
Chemistry: 2nd year spring term (periods 3 and 4)
Geosciences: 2nd year spring term (periods 3 and 4)

Learning outcomes:
By the end of the course, you are expected to have demonstrated the ability to:
use appropriate strategies and techniques for communicating effectively in English in an academic context in your own field
prepare and present scientific subjects from your own field of studies to your classmates, using appropriate field-related vocabulary.

Contents:
In the classroom, you will practice the skills of listening, speaking and presenting topics in your own field. The emphasis is on working in pairs and small groups. In addition, you will complete independent homework assignments to support the classroom learning.
Mode of delivery:
The course is implemented using blended methods, which may include distance teaching, classroom instruction and activities in the Moodle learning environment.
Learning activities and teaching methods:
The English 2 course is tailored to the needs of students in different fields of study, and thus the materials and implementation methods of the course vary between groups. The teacher will provide a more detailed schedule and list of homework tasks. There will be 26 hours of guided teaching events and 28 hours of independent work, including both individual and group work.

Target group:
2nd year students of Biology, Chemistry, Geoscience
1st year students of Mathematical and Physical Sciences

Prerequisites and co-requisites:
Prequisite course: 902002Y English 1, unless exempted
Recommended optional programme components:
-
Recommended or required reading:
Materials will be provided in electronic format or are available from the library.
Assessment methods and criteria:
Continuous assessment is based on regular attendance, active participation in all lessons and the successful completion of all homework tasks. The assessment of the course is based on the learning outcomes of the course.

Grading:
Pass / fail.
Person responsible:
Karen Niskanen
Working life cooperation:
-
Other information:
-

030005P: Information Skills, 1 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Technology

Arvostelu: 1 - 5, pass, fail

Opettajat: Ursula Heinikoski

Opintokohteen kielet: Finnish

Leikkaavuudet:

030004P	Introduction to Information Retrieval	0.0 op

ECTS Credits:
1 ECTS credit / 27 hours of work
Language of instruction:
Finnish
Timing:
Architecture 3. spring semester, period III;
biochemistry 3. autumn semester;
biology 3. autumn semester, period I;
chemistry 3. autumn semester, period I;

civil engineering 2. spring semester, period IV;
computer science and engineering 2. spring semester, period IV;
electronics and communications engineering 3. spring semester;
geosciences 2. spring semester, period IV;
geography 3. semester, periods I and III;
industrial engineering and management 3. year;
information processing sciences 1. or 3. year;
mathematics and physics 1. spring semester, period III;
mechanical engineering 3. year;
mining engineering and mineral processing 3. year;
process and environmental engineering 2. year, period II;
Master's degree students in industrial engineering and management 1st year.

Learning outcomes:
Upon completion of the course, the students:
- can search scientific information,
- can use the most important databases of their discipline,
- know how to evaluate search results and information sources,
- can use the reference management tool.

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

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

Learning activities and teaching methods:
Training sessions 8 h, group working 7 h, self-study 12 h

Target group:
Compulsory for all bachelor degree students of Faculty of information technology and electrical engineering, Faculty of Technology and Faculty of science. Compulsory also for those Master's degree students in Industrial Engineering and Management who have no earlier studies in the information skills. Optional for the students of biochemistry.

Recommended optional programme components:
In biochemistry the course is completed as a part of 740376A Bachelor's Thesis.

Recommended or required reading:
Web learning material Tieteellisen tiedonhankinnan opas

Assessment methods and criteria:
Passing the course requires participation in the training sessions and successful completion of the course assignments.

Grading:
pass/fail

Person responsible:
Ursula Heinikoski

780078Y: Orientation Course for New Students, 1 op

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Matti Niemelä

Opintokohteen kielet: Finnish

ECTS Credits:
1 credits / 27 hours of work

Language of instruction:
Finnish

Timing:
1 st autumn and 1 st spring.

Learning outcomes:
Upon completion of the course:
- The student should be able to find different places in the learning environment
- He/she also knows how to register for courses and examinations.
- He/she can use the services offered to students by the university and the Student Union.

- After making the personal study plan, the student can describe the structure of B.Sc. degree in chemistry

Contents:
The course comprises several modules: Orientation week program, orientation in small groups, tutor teaching meetings and PSP (Personal Study Plan).

Mode of delivery:
Face-to-face teaching, compulsory

Learning activities and teaching methods:
The programme of the orientation week, orientation in small groups: 10-15 hours of visits and discussions with the group tutor and tutor teacher. Making of PSP (Personal Study Plan).

Target group:
Chemistry, compulsory

Prerequisites and co-requisites:
No prerequisites

Recommended optional programme components:
The course is an independent entity and does not require additional studies carried out at the same time.

Recommended or required reading:
Material given by tutors

Assessment methods and criteria:
Participation in the programme of the orientation week, small group meetings, tutor teaching meetings and making a Personal Study Plan for B.Sc. Degree (and M.Sc. Degree).

Grading:
The course utilizes verbal grading scale pass/fail.

Person responsible:
Matti Niemelä, Helena Tirri, Small group tutors

Working life cooperation:
No

Other information:
The course is completed when all course parts are passed.

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

Voimassaolo: 01.08.2014 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Opintokohteen kielet: Swedish

Leikkaavuudet:

901061Y	Second Official Language (Swedish), Oral Skills	1.0 op
ay901035Y	Second Official Language (Swedish), Oral Skills (OPEN UNI)	1.0 op
901004Y	Swedish	2.0 op

Proficiency level:
This course is only for Finnish speaking students with CEFR-level A2-B1 in Swedish language. There are no beginner courses in Swedish at the university.

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

Voimassaolo: 01.08.2014 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Opintokohteen kielet: Swedish

Leikkaavuudet:

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

Proficiency level:
B1/B2/C1
This course is only for Finnish speaking students with CEFR-level A2 in Swedish language. We don’t offer Beginners courses in Swedish.
Status:

Required proficiency level:

Contents:

Learning activities and teaching methods:

Recommended optional programme components:
-
Recommended or required reading:

Assessment methods and criteria:

Working life cooperation:
-

780079Y: Tutoring, 1 op

Opiskelumuoto: General Studies
Laji: Course
Vastuuyksikkö: Field of Chemistry
Arvostelu: 1 - 5, pass, fail
Opettajat: Helena Tirri
Opintokohteen kielet: Finnish

ECTS Credits:
1 credits/ 27 hours of work
Language of instruction:
Finnish
Timing:
2 nd autumn or 3 rd autumn
Learning outcomes:
Upon completion of the course, the student can act as a group leader. He/she can tell to other people about the department of chemistry as well as the studies in the degree programme of chemistry.

Contents:
Meetings and discussions with the small group. Tours in the university campus.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Meetings and discussions with the small group. Tours in the university campus.
Target group:
Chemistry. Optional
Prerequisites and co-requisites:
2nd or 3th year student
Recommended optional programme components:

The course is an independent entity and does not require additional studies carried out at the same time.
Recommended or required reading:
Material given by the Student Services, Faculty of Science and the Department of Chemistry in their schoolings.
Assessment methods and criteria:
The student acts as small group leader in the degree programme of chemistry. After this, he/she collects the feedback from the students and makes a report about the course. The feedback is attached to the report.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
The course utilizes verbal grading scale pass/fail.
Person responsible:
Amanuensis and Student Services
Working life cooperation:
No
Other information:
No

A325201: Chemistry, Basic Studies, 25 - 31,5 op

Opiskelumuoto: Basic Studies
Laji: Study module
Vastuuyksikkö: Field of Chemistry
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish
Voidaan suorittaa useasti: Kyllä

Ei opintojaksokuvauksia.

be

780117P: General and Inorganic Chemistry A, 5 op

Voimassaolo: 01.08.2015 -
Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Field of Chemistry
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish
Leikkaavuudet:

780120P	Basic Principles in Chemistry	5.0 op
ay780117P	General and Inorganic Chemistry A (OPEN UNI)	5.0 op
780115P	General and Inorganic Chemistry II	6.0 op
780114P	General and Inorganic Chemistry I	6.0 op
780113P	Introduction to Chemistry	12.0 op
780102P	Introduction to Inorganic Chemistry	5.0 op
780109P	Basic Principles in Chemistry	4.0 op

ECTS Credits:
5 credits / 134 hours of work
Language of instruction:
Finnish
Timing:
1st autumn
Learning outcomes:
After this course, the student:
- can explain organic and inorganic chemistry fundamentals, basic concepts and terminology.

- understand basic concepts of chemistry as described in international general chemistry curriculum.

Contents:

Basic concepts of chemistry, chemical formula, chemical reaction, chemical equation, oxidation-reduction reactions, stoichiometry, gases, chemical equilibrium, acids and bases, additional aspects of acid-base equilibria, solubility and complex-ion equilibria.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

30 hours of lectures and applications, 20 hours of exercises and 85 hours of self-study.

Target group:

Biochemistry, Chemistry compulsory. In the entity of 25 credits (minor studies), compulsory.
Physical sciences, Mathematical sciences, optional.

Prerequisites and co-requisites:

Upper secondary school chemistry.

Recommended optional programme components:

-

Recommended or required reading:

Petrucci, R.H., Herring, F.G., Madura, J.D. ja Bissonnette, C.: General Chemistry: Principles and Modern Applications, 11. edition (also 7., 8., 9. ja 10. edition), Pearson Canada Inc., Toronto, 2017. Chapters 1-6, 14.2, 15-18.

Assessment methods and criteria:

Two intermediate examinations or one final examination.
Read more about assessment criteria at the University of Oulu webpage.

Grading:

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

Person responsible:

Johanna Havia

Working life cooperation:

No

Other information:

No

780118P: General and Inorganic Chemistry B, 5 op

Voimassaolo: 01.08.2015 -
Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Field of Chemistry
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish
Leikkaavuudet:

ay780118P	General and Inorganic Chemistry B (OPEN UNI)	5.0 op
780114P	General and Inorganic Chemistry I	6.0 op
780115P	General and Inorganic Chemistry II	6.0 op
780113P	Introduction to Chemistry	12.0 op
780101P	Introduction to Physical Chemistry	7.0 op
780102P	Introduction to Inorganic Chemistry	5.0 op

ECTS Credits:

5 ECTS credits / 134 hours of work

Language of instruction:

Finnish

Timing:

1st autumn

Learning outcomes:

After this course, the student:
- can explain inorganic chemistry fundamentals, basic concepts and terminology
- understand basic concepts of chemistry as described in international general chemistry curriculum.

Contents:

Thermodynamics, reaction kinetics, electrochemistry, electrons in atoms, periodic table, chemical bond, intermolecular forces.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

32 hours of lectures and applications, 18 hours of exercises, 85 hours of self-study.

Target group:

Biochemistry, Chemistry, compulsory. In the entity of 25 credits (minor studies), compulsory.
Physical sciences, Mathematical sciences, optional.

Prerequisites and co-requisites:

Upper secondary school chemistry.

Recommended optional programme components:

-

Recommended or required reading:

Petrucci, R.H., Herring, F.G., Madura, J.D. ja Bissonnette, C.: General Chemistry: Principles and Modern Applications, 11. edition (also 7., 8., 9. ja 10. edition), Pearson Canada Inc., Toronto, 2017. Chapters 7-11.1- 11.7, 12.1, 13, 19-20.

Assessment methods and criteria:

Two intermediate examinations or one final examination.
Read more about assessment criteria at the University of Oulu webpage.

Grading:

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

Person responsible:

Matti Niemelä

Working life cooperation:

No

Other information:

No

780116P: Introduction to Organic Chemistry, 5 op

Voimassaolo: 01.08.2015 -
Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Field of Chemistry
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish
Leikkaavuudet:

ay780116P	Introduction to Organic Chemistry (OPEN UNI)	5.0 op
780103P2	Organic Chemistry I	6.0 op
780108P	Basic Course in Organic Chemistry	6.0 op

780112P	Introduction to Organic Chemistry	4.0 op
780103P	Introduction to Organic Chemistry	6.0 op

ECTS Credits:

5 ECTS credits / 134 hours of work

Language of instruction:

Finnish. Book-examination in English as well.

Timing:

1st spring

Learning outcomes:

After this course, the student:
- can recognize and name basic organic compunds and explain their properties.
- can explain organic chemistry basic consepts.
- can deduce basic recation types and solve their mechanisms.

Contents:

Classification of organic compounds and their properties. Basic reactions of organic compounds: addition, elimination and substitution along with the reaction mechanisms. Basics of stereochemistry.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

38 hours of lectures plus 12 hours of exercises, 84 hours of independent self-study.

Target group:

Biochemistry, Chemistry, Biology, Process Engineering, Environmental Engineering and in the study entity of 25 credits, compulsory.
Physical Sciences, Geology, Geograhpy, Mathematical Sciences, optional.

Prerequisites and co-requisites:

Upper secondary school chemistry

Recommended optional programme components:

The course is an independent entity and does not require additional studies carried out at the same time.

Recommended or required reading:

Hart, H.: Organic Chemistry: A Short Course, 10. ed. or newer, Houhgton Mifflin, Boston, 1999; Hart, H. ja Hart, D.: Study Guide & Solutions Book, Organic Chemistry: A Short Course, 10. ed. or newer, Houghton Mifflin, Boston, 1999 and material in Moodle.

Assessment methods and criteria:

Two intermediate examinations or one final examination.
Read more about assessment criteria at the University of Oulu webpage.

Grading:

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

Person responsible:

Johanna Kärkkäinen

Working life cooperation:

No

780119P: Introduction to Analytical Chemistry, 5 op

Voimassaolo: 01.08.2015 -
Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Field of Chemistry
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

Leikkaavuudet:

780111P	Introduction to Analytical Chemistry	4.0 op
780110P	Analytical Chemistry I	5.5 op

ECTS Credits:

5 ECTS credits / 134 hours of work

Language of instruction:

Finnish

Timing:

2nd autumn

Learning outcomes:

Upon completion the student should have acquired knowledge and understanding of basic concepts of quantitative chemical analysis employing classical methods of analysis.

Contents:

Steps in quantitative analysis, statistical evaluation of analytical data, chemical equilibrium in aqueous solutions, gravimetry, titrimetry, spectrophotometry.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

30 hours of lectures + 20 hours of exercises + 84 hours of self-study

Target group:

Chemistry, compulsory. In the study entity of 25 credits compulsory.
Mathematical Sciences, Physical Sciences, optional.

Prerequisites and co-requisites:

General and Inorganic Chemistry A (780117P) and General and Inorganic Chemistry B (780118P), or General and Inorganic Chemistry I (780114P) and General and Inorganic Chemistry II (780115P), or Introduction to Chemistry (780113P), or Basic Principles in Chemistry (780109P).

Recommended optional programme components:

The course is an independent entity and does not require additional studies carried out at the same time.

Recommended or required reading:

Harvey, D.: Analytical Chemistry 2.0-an open-access digital textbook (can be loaded from Internet).
Saarinen, H. ja Lajunen, L.H.J.: Analyyttisen kemian perusteet, Oulun yliopistopaino, 2004.

Assessment methods and criteria:

Two intermediate examinations or one final examination.

Grading:

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

Person responsible:

Paavo Perämäki

Working life cooperation:

No

780127P: Principles of Chemistry Labwork, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

780123P Introductory Laboratory Works in Chemistry 5.0 op
780330A-01 Laboratory Course I in Inorganic Chemistry (1. part) 2.0 op
780122P Introductory Laboratory Course in Chemistry 3.0 op

ECTS Credits:

5 credits / 135 hours of work

Language of instruction:

Finnish

Timing:

1st spring

Learning outcomes:

After this course, the student can apply laboratory safety instructions and act accordingly. He/she can communicate by using basic laboratory terminology, identifies basic laboratory equipment and can use them properly. He/she recognizes the importance of the planning of the laboratory work. The student is able to utilize the basic chemistry techniques and determination methods in the given task. Furthermore, the student can also make laboratory notes and write a report on the performed task.

Contents:

Laboratory safety, basic laboratory equipment, basic chemistry techniques and determination methods as well as some of their theoretical background, problems related to the studied determination methods, keeping a laboratory notebook, writing a report.

Mode of delivery:

Supervised laboratory work, independently done preparatory problems and reports.

Learning activities and teaching methods:

Safety in laboratory 2 hours, 60 hours of laboratory works, 73 hours of self-study.

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

General and Inorganic Chemistry A (780117P) and Introduction to Organic Chemistry (780116P). Student is allowed to participate to the course simultaneously when participating the prerequisites. Attendance at the lecture of Safety in laboratory is compulsory.

Recommended optional programme components:

Participation in the courses General and Inorganic Chemistry (780117P, 5 cr) and Introduction to Organic Chemistry (780116P, 5 cr).

Recommended or required reading:

Instruction Book (in Finnish)

Assessment methods and criteria:

Accomplishment of the course requires accepted preparatory problems, laboratory exercises and problems related to them.

Grading:

The course utilizes verbal grading scale pass/fail.

Person responsible:

Teija Kangas

Working life cooperation:

No

Other information:

Attendance at the lecture of Safety at work is compulsory.

781321A: Bachelor's Thesis, 8 op

Voimassaolo: 01.01.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
8 ECTS credits / 215 hours of work
Language of instruction:
Finnish, English on demand
Timing:
3rd autumn and 3rd spring
Learning outcomes:
After this course, the student
- can search scientific information from the chemistry literature
- He/she can estimate, structure and apply the information while writing a scientific report as well as preparing a poster and oral presentation
- can adapt the principles of the oral presentation for a talk and apply ethical principles for research and reporting
- can work in a group, present a poster or give a scientific talk for an audience.

Contents:
Chemistry literature, guidelines for good scientific practice and scientific writing. Preparation and presentation of a poster and seminar talk from the subject, which is related to the Bachelor's thesis. The structure, content and preparation of the Bachelor's thesis.
Mode of delivery:
Blended teaching
Learning activities and teaching methods:
10 h of the lectures, a poster seminar (3 h) and 10 h of online work and exercises. Independent work with the Bachelor Thesis. The attendance in the seminar talks of the fellow students and the student's own scientific presentation on a scientific subject related to the B.Sc. thesis (20 min.) during a spring term.
Target group:
Chemistry, Chemistry subject teacher, compulsory.
Prerequisites and co-requisites:
The first and second year courses in Chemistry.
Recommended optional programme components:
The course Information Search (030005P), 1 credit, has to be done during this course.
Recommended or required reading:
Lecture handout.
Assessment methods and criteria:
The preparation and introduction of a poster. The thesis of ca. 20 pages including ca. 20 references. The student gives a scientific presentation (20 min). The compulsory attendance at the lectures and seminars. The analysis of the student's own and fellow students' seminar talks. In addition, the student takes a maturity examination on the subject of the B.Sc. thesis.
Bachelor Thesis has to be upload to Laturi, when supervisor has approved it.
Grading:
The Poster: a verbal grading scale pass/fail.
The thesis and seminar talk are evaluated on a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:
Lecturer Johanna Kärkkäinen. The Bachelor's thesis is supervised by Professors, Docents, University Lectures or Post-doctoral Researchers.
Working life cooperation:
No
Other information:
Enrolment for the course Information Search (030005P) is done through WebOod at the beginning of the course.

781301A: Inorganic Chemistry I, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

780353A	Inorganic Chemistry I	6.0 op
780356A	Inorganic Chemistry	9.0 op

ECTS Credits:
5 credits / 134 hours of work
Language of instruction:
Finnish
Timing:
2nd spring
Learning outcomes:
After this course the student is familiar with the most important basic principles of modern inorganic chemistry.
Contents:
Atomic structure, chemical bond and molecular structure, molecular symmetry, solid state chemistry, acid-base theories.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
38 hours of lectures, 10 hours of exercises, self-study 86 hours
Target group:
Chemistry, compulsory
Prerequisites and co-requisites:
General and Inorganic Chemistry A (780117P) and General and Inorganic Chemistry B (780118P) OR General and Inorganic Chemistry I (780114P) and General and Inorganic Chemistry II (780115P) or Introduction to Chemistry (780113P)
Recommended optional programme components:
The course is an independent entity and does not require additional studies carried out at the same time.
Recommended or required reading:
Weller, M., Overton, T., Rourke, J., and Armstrong, F.: Inorganic Chemistry, 7 th ed., Oxford University Press, Oxford 2018. Chapters 1-5, 8.
Assessment methods and criteria:
The assessment of the course is based on the final examination.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:
Raija Oilunkaniemi
Working life cooperation:
No
Other information:
No

781302A: Inorganic Chemistry II, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Raija Oilunkaniemi

Opintokohteen kielet: Finnish

Leikkaavuudet:

780391A	Inorganic Chemistry II	4.0 op
780356A	Inorganic Chemistry	9.0 op
781642S	Inorganic Chemistry II	4.0 op

ECTS Credits:
5 credits / 134 hours of work
Language of instruction:
Finnish/English on demand
Timing:
2nd spring
Learning outcomes:
After this course the student is familiar with basic concepts of coordination chemistry of transition metal complexes.
Contents:
Structure, bonding and reactions of complexes of transition metals and their chemical and spectroscopic properties, organometallic chemistry, catalysis.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
32 hours of lecture, 10 hours of exercises, self-study 92 hours
Target group:
Chemistry, compulsory
Prerequisites and co-requisites:
Inorganic Chemistry I (781301A) lectures
Recommended optional programme components:
The course is an independent entity and does not require additional studies carried out at the same time.
Recommended or required reading:
Weller, M., Overton, T., Rourke, J., and Armstrong, F.: Inorganic Chemistry, 7 th ed., Oxford University Press, Oxford 2018. Chapters 6, 7, 19-27.
Assessment methods and criteria:
The assessment of the course is based on the final examination.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:
Raija Oilunkaniemi
Working life cooperation:
No
Other information:
No

781308A: Instrumental Analysis, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

780328A	Instrumental Analysis	4.0 op
780324A	Analytical Chemistry II	4.0 op

ECTS Credits:
5 ECTS credits / 134 hours of work
Language of instruction:
Finnish
Timing:
3rd autumn
Learning outcomes:
After completing this course, the student should be able to understand the principles of most common instrumental methods of analysis that are used, for example, in industry and research.
Contents:
Atomic and molecular spectroscopy, X-ray fluorescence spectrometry, Electroanalytical methods, Thermal analysis, Mass spectrometry, Chromatography.

Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
40 hours of lectures + 6 hours of exercises + 88 hours of self-study
Target group:
Chemistry, compulsory
Prerequisites and co-requisites:
Introduction to Analytical Chemistry (780119P)
Recommended optional programme components:
The course is an independent entity and does not require additional studies carried out at the same time.
Recommended or required reading:
Skoog, D.A., Holler, F.J., Crouch, S.R.: Principles of Instrumental Analysis, 6th ed., Thomson Brooks/Cole, 2007, partly.

Assessment methods and criteria:
Two intermediate examinations or one final examination.
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:
Paavo Perämäki
Working life cooperation:
No

780354A: Laboratory Course I in Inorganic Chemistry, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 ECTS credits / 134 hours of work
Language of instruction:
Finnish
Timing:
2nd spring
Learning outcomes:
At the end of the course: the students should have acquired an understanding of:
- basic qualitative inorganic chemistry
- classical quantitative inorganic chemistry
- basic inorganic synthetic chemistry
- laboratory safety issues

Contents:
Water analysis, neutralization, synthesis and characterization of inorganic compound.
Mode of delivery:
Face-to-face teaching, compulsory
Learning activities and teaching methods:
80 hours of laboratory work, 54 hours of self-study.
Target group:
Chemistry, compulsory
Prerequisites and co-requisites:
General and Inorganic Chemistry A and B (780117P and 780118P), Introduction to Organic Chemistry (780103P or 780112P or 780116P). Introductory Laboratory Course in Chemistry (780122P or 780123P).
Recommended optional programme components:
The course is an independent entity and does not require additional studies carried out at the same time.
Recommended or required reading:
Material handed out in the laboratory
Assessment methods and criteria:
Works, reports and the final exam passed. The works must be done within the next two years.

Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail. 75 % laboratory work and 25 % final examination.
Person responsible:
Matti Niemelä and Johanna Havia
Working life cooperation:
No
Other information:
Reports must be returned to the teaching assistants by the given deadline. Otherwise you have to do the work again.

781307A: Laboratory Course I in Organic Chemistry, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

780329A Laboratory Course I in Organic Chemistry 4.0 op

ECTS Credits:
5 ECTS credits / 134 hours of work
Language of instruction:
Finnish, English on demand, materials in English (partly)
Timing:
2nd autumn
Learning outcomes:
Upon completion of the five different syntheses of the course, the student is familiar with safety issues, glassware and equipment, use of laboratory notebook and reporting of laboratory experiments. He/she should be able to work by using basic techniques of organic chemistry such as distillation, extraction, crystallization, TLC.
Contents:
Different organic syntheses.
Mode of delivery:
Face-to-face teaching in the laboratory
Learning activities and teaching methods:
8 h lectures (obligatory for all), 50 h laboratory of supervised, independent laboratory work and 73 h self-study and reporting, seminar 3 h.
Target group:
Chemistry, compulsory
Prerequisites and co-requisites:
General and Inorganic Chemistry A and General and Inorganic Chemistry B (780117P and 780118P), Introduction to Organic Chemistry (780116P), and Introductory Laboratory Course (780123P/780127P) passed.
Or General and Inorganic Chemistry I and General and Inorganic Chemistry II (780114P and 780115P), or Introduction to Chemistry (780113P) or Introduction to Physical Chemistry (780101P) and Introduction to Inorganic Chemistry (780102P) or Basic Principles in Chemistry (780109P), Introduction to Organic Chemistry (780103P), and Introductory Laboratory Course (780122P or 780123P) passed.
Recommended optional programme components:
Participation in the course 781305A Organic Chemistry I.
Recommended or required reading:
Hart, H.: Organic Chemistry: A Short Course, 10. ed or newer, Houhgton Mifflin, Boston, 1999; Clayden, J., Greeves, N., Warren, S.: Organic Chemistry, Oxford University Press, 2. ed., 2012.
Assessment methods and criteria:
Syntheses, preliminary exercises, laboratory notebook, reports and the preliminary exam passed. The syntheses must be done within the next two years.
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:
Johanna Kärkkäinen
Working life cooperation:
No

Other information:
The reports must be returned to the teacher by the given deadline. Otherwise you have to do the work again.

780331A: Laboratory Course I in Physical Chemistry, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Anne Heponiemi

Opintokohteen kielet: Finnish

ECTS Credits:
5 credits / 134 hours of work
Language of instruction:
Finnish
Timing:
2 nd autumn
Learning outcomes:
Upon completion of the course: the student should have acquired an understanding of:

- laboratory safety issues
- basic physical chemistry experimental methods
- how to produce the laboratory report about the examined issue

Contents:
Calorimetric studies, distribution law, vapour pressure of solvent, partial mole volume, distillation of a mixture of liquids, crystallization of a liquid mixture, electromotive force.
Mode of delivery:
Face-to-face teaching. The course contains guided laboratory works, which include independently written laboratory reports from the works.
Learning activities and teaching methods:
2 hours lecture of laboratory safety at work (obligatory), 13 hours of preliminary exercises, 38 hours of laboratory experiments, written laboratory reports and independent work of student, 76 hours, final seminar 5 hours.
Target group:
Chemistry, compulsory
Prerequisites and co-requisites:
Courses General and Inorganic Chemistry A (780117P) and General and Inorganic Chemistry B (780118P) OR Courses General and Inorganic Chemistry I (780114P) and General and Inorganic Chemistry II (780115P), and Introductory Laboratory Works in Chemistry (780122P or 780123P) passed.
Recommended optional programme components:
Courses General and Inorganic Chemistry A (780117P) and General and Inorganic Chemistry B (780118P) OR Courses General and Inorganic Chemistry I (780114P) and General and Inorganic Chemistry II (780115P), and Introductory Laboratory Works in Chemistry (780122P or 780123P), Physical Chemistry I 781303A.
Recommended or required reading:
Practical work handout; Atkins, P. W.: Physical Chemistry, 10 th ed., Oxford University Press, 2014, partly. Or an older editions.
Assessment methods and criteria:
Preliminary exercises, laboratory works and reports passed. The works must be done within the next two years.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:
Anne Heponiemi
Working life cooperation:
No
Other information:
Reports must be returned to the teachers by the given deadline. Otherwise the work have to be done again.

780381A: Maturity test, 0 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
0 credits / 3 hours of work
Language of instruction:
Finnish (Swedish or English)
Timing:
3 rd spring
Learning outcomes:
Upon completion the maturity test the student has shown thar he/she can descibe his/her research topic in a logical and crispy way using scientific terminology typical to chemistry.
Contents:
An essay-type test of the topic the B.Sc. Thesis. The maturity test is a test for the language skill and for the knowledge of the research topic.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Writing an essay of the topic of the thesis, 3 hours work
Target group:
Chemistry, compulsory
Prerequisites and co-requisites:
The B.Sc. Thesis
Recommended optional programme components:
The course is an independent entity and does not require additional studies carried out at the same time.
Recommended or required reading:
The B.Sc. Thesis
Assessment methods and criteria:
The writing of the maturity test is agreed with the supervisor.
Grading:
The course utilizes verbal grading scale pass/fail.
Person responsible:
Professors, Docents, Lectures, Doctor level researchers of the Chemistry Department
Working life cooperation:
No
Other information:
No

781305A: Organic Chemistry I, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

780389A	Organic Chemistry I	6.0 op
780385A	Organic Chemistry I	9.0 op

ECTS Credits:
5 ECTS credits / 134 hours of work
Language of instruction:
Finnish
Timing:
2nd autumn
Learning outcomes:

After passing the course the student can explain the basics in molecular orbitals in simple organic compounds such as ethane, details in nucleophilic substitution, conformation and the basics in stereochemistry of organic compounds.
Contents:
Including molecular orbitals in organic compounds, conformation theory, nucleophilic substitution and basics of stereochemistry.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
40 hours of lectures, 94 hours self study
Target group:
Chemistry, compulsory. In the entity of 60 credits, compulsory.
Prerequisites and co-requisites:
Introduction to Organic Chemistry (780103P or 780116P) and the courses General and Inorganic Chemistry A (780117P) and General and Inorganic Chemistry B (780118P); or the courses General and Inorganic Chemistry I (780114P) and General and Inorganic Chemistry II (780115P); OR Introduction to Chemistry (780113P) or Introduction to Physical Chemistry (780101P).
Recommended optional programme components:
The course is an independent entity and does not require additional studies carried out at the same time.
Recommended or required reading:
Clayden, J., Greeves, N., Warren, S., Wothers, P.: Organic Chemistry, Oxford University Press, 2001 and Clayden, J., Greeves, N., Warren, S.: Organic Chemistry, Oxford University Press, 2nd Edition, 2012.
Assessment methods and criteria:
Two intermediate examinations or one final examination.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:
Juha Heiskanen
Working life cooperation:
No

781306A: Organic Chemistry II, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

780393A	Organic Chemistry II	4.0 op
780386A	Organic Chemistry II	9.0 op
783643S	Organic Chemistry II	4.0 op

ECTS Credits:
5 ECTS credits / 134 hours of work
Language of instruction:
Finnish/English on demand
Timing:
2nd spring
Learning outcomes:
After this course, the student can profoundly explain and analyze mechanisms of various organic chemistry reactions and predict reaction outcome.
Contents:
Eliminations, addition to alkenes, Diels-Alder reactions, chemistry of aromatic heterocycles, formation of enols and enolates and their reactions.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
38 hours of lectures, 96 hours of self study

Target group:
Chemistry, compulsory
Prerequisites and co-requisites:
Organic Chemistry I (781305A)
Recommended optional programme components:
The course is an independent entity and does not require additional studies carried out at the same time.
Recommended or required reading:
Lecture material and Clayden, J., Greeves, N., Warren, S., Wothers, P.: Organic Chemistry, Oxford University Press, 2001 and Clayden, J., Greeves, N., Warren, S.: Organic Chemistry, 2nd edition, Oxford University Press, 2012.
Assessment methods and criteria:
Final examination.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:
Juha Heiskanen
Working life cooperation:
No

781303A: Physical Chemistry I, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

780347A	Physical Chemistry I	6.0 op
780318A	Physical Chemistry II	6.5 op

ECTS Credits:
5 ECTS credits
Language of instruction:
Lectures are given in Finnish. The examinations can be arranged in english and the textbook helps studying in english.
Timing:
The course is held in the spring semester. It is recommended to complete the course at the 1st spring semester.
Learning outcomes:
Upon completion the student should be able to display an understanding of the main topics of chemical thermodynamics and kinetics. During the course such concepts are introduced that are needed for the discussion of equilibria in chemistry. Much emphasis is in enthalpy, entropy and Gibbs energy. A unified view of equilibrium and the directions of spontaneous change are obtained in terms of chemical potentials of substances.
Contents:
PART I, “Equilibrium” from the textbook.
Mode of delivery:
Lectures and excercises.
Learning activities and teaching methods:
48 h lectures, 12 h excercises
Target group:
Chemistry, Chemistry teacher
Recommended optional programme components:
The course is an independent entity and does not require additional studies carried out at the same time.
Recommended or required reading:
Atkins’ Physical Chemistry, 8th Edition (or any other edition)
Assessment methods and criteria:
Examinations are based on the textbook
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:

Jouni Pursiainen
Working life cooperation:
The course does not contain direct working life cooperation.

781304A: Physical Chemistry II, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Pursiainen Jouni

Opintokohteen kielet: Finnish

Leikkaavuudet:

780392A	Physical Chemistry II	4.0 op
780319A	Physical Chemistry III	6.5 op
782631S	Physical Chemistry II	4.0 op

ECTS Credits:
5 ECTS credits
Language of instruction:
Lectures are given in Finnish. The examinations can be arranged in english and the textbook helps studying in english.
Timing:
The course is held in the autumn semester. It is recommended to complete the course at the 2nd autumn semester.
Learning outcomes:
Upon completion the student should be able to display an understanding of the main topics molecular motion, kinetics, reaction dynamics and solid surfaces.
Contents:
Atkins' textbook, chapters 21-25.
Mode of delivery:
Lectures and excercises.
Learning activities and teaching methods:
32 h lectures, 10 h excercises.
Target group:
Chemistry, Chemistry teacher
Recommended optional programme components:
The course is an independent entity and does not require additional studies carried out at the same time.
Recommended or required reading:
Atkins' Physical Chemistry, 8th Edition (or any other edition).
Assessment methods and criteria:
Examinations are based on the textbook.
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:
Jouni Pursiainen
Working life cooperation:
The course does not contain direct working life cooperation.

780301A: Research Training, 9 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Anne Heponiemi, Juha Heiskanen, Matti Niemelä

Opintokohteen kielet: Finnish

ECTS Credits:
9 ECTS credits / 240 hours of work
Language of instruction:
Finnish, English on demand, materials in English (partly).
Timing:
3 rd autumn-spring
Learning outcomes:
Inorganic chemistry: After completing this course, the student should be able to work independently in the laboratory and have ability to write a scientific report.
Physical Chemistry:
Upon completion of the course the student should have acquired an understanding of:

- laboratory safety issues
- how to perform physical chemistry experiments independently
- how to produce the scientific laboratory report about the examined issue

Organic chemistry: After completing this course, the student is able to carry out laboratory scale syntheses, document the stages of work and write a scientific report.
Contents:
in Inorganic Chemistry: Three laboratory projects on different fields of inorganic chemistry: ICP-OES-analysis, protonation constant, XRD experiment. Additionally, written laboratory reports, one per practical.
in Physical Chemistry: Bomb calorimetric study, conductivity of an electrolytic solution, rate of chemical reaction, adsorption of solution, surface tension.
in Organic Chemistry: Four synthetic exercises. Basics of FTIR and ^{1}H NMR analytical methods.
Additionally, written laboratory reports, one per practical.
Mode of delivery:
Supervised laboratory works
Learning activities and teaching methods:
240 hours of laboratory works and reports (80 h/laboratory). See more detailed information from description each of module 780301A-01, 780301A-02 and 780301A-03.
Target group:
Chemistry, compulsory
Prerequisites and co-requisites:
The compulsory courses of chemistry in the first and second year.
Recommended optional programme components:
The course is an independent entity and does not require additional studies carried out at the same time.

Recommended or required reading:
Working instructions
Assessment methods and criteria:
Laboratory works and reports passed.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:
Matti Niemelä, Johanna Havia, Raija Oilunkaniemi, Anne Heponiemi, Juha Heiskanen
Working life cooperation:
No
Other information:
The reports must be returned by the given deadline, otherwise the work has to be done again.

800119P: Functions and limit, 5 op

Voimassaolo: 01.01.2017 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opettajat: Pekka Salmi

Opintokohteen kielet: Finnish

Leikkaavuudet:

802162P Continuity and Limit 5.0 op

802155P Continuity and limit 4.0 op

ECTS Credits:
5 ECTS credits / 133 hours of work
Language of instruction:
Finnish
Timing:
1st year, 1st period
Learning outcomes:
Upon completing the course the student is:
- able to apply the triangle inequality and make approximations
- able to manipulate elementary functions such as polynomials and trigonometric functions
- able to define the limit of a sequence and the limit of a function as well as apply these definitions
- able to apply different techniques to determine limits.
Contents:
The course concerns real-valued functions of one variable. In particular elementary functions are defined and the monotonicity of functions is studied. The notion of absolute value is reviewed and applied to approximation. Also the triangle inequality is used in approximation. The central concept is the limit of a function, which is introduced via the limit of a sequence. The aim of the course is to improve deductive skills as well as computational skills.
Mode of delivery:
Face-to-face teaching, (computer exercises)
Learning activities and teaching methods:
28 h lectures, 14 h exercises, 91 h independent study
Target group:
1st year mathematics and physics students as well as students taking mathematics as a minor subject
Prerequisites and co-requisites:
Introduction to mathematical deduction 802151P is recommended to be taken simultaneously (or earlier).
Recommended optional programme components:
-
Recommended or required reading:
Lecture notes, (STACK exercises).
Additional material: for example the book P. Harjulehto, R. Klén, M. Koskenoja, Analyysiä reaaliluvuilla.
Assessment methods and criteria:
Final exam, exercises
Grading:
1-5, fail
Person responsible:
Pekka Salmi
Working life cooperation:
No
Other information:
Replaces the course 802162P Continuity and Limit.

802120P: Introduction to Matrices, 5 op

Voimassaolo: 01.06.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

802118P Linear Algebra I 4.0 op

ECTS Credits:
5 ECTS credits
Language of instruction:
Finnish
Timing:
1. year, 4. period
Learning outcomes:

After completing the course the student is able to:
- apply arithmetic operations of matrices
- solve system of linear equations by matrix methods
- study linear depence and linear indepence of vectors
- recognize the subspace of R^n and understands the concepts of basis and dimension of a vector space
- analyse matrices by the parameters and the vectors

Contents:
Vectors and matrices, Systems of linear equations, determinant of a matrix, subspaces of R^n, linear depence and linear indepence of vectors, base, dimension, eigenvalues and eigenvectors of a matrix, diagonalization, LU - factorization of a matrix.

Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
Lectures 28 h, Exercises 14 h

Target group:
Major and minor studies

Prerequisites and co-requisites:
802151P Introduction to Mathematical Deduction

Recommended or required reading:
Lecture notes.
Grossman, S.I. : Elementary Linear Algebra, David C. Lay: Linear Algebra and Its Applications.

Assessment methods and criteria:
Final exam

Grading:
Fail, 1-5

Person responsible:
Marko Leinonen

Working life cooperation:
-

802151P: Introduction to mathematical deduction, 5 op

Voimassaolo: 01.08.2009 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay802151P	Introduction to mathematical deduction (OPEN UNI)	5.0 op

ECTS Credits:
5 ECTS credits

Language of instruction:
Finnish

Timing:
First period at the first semester.

Learning outcomes:
After completing the course, the student:
- is able to understand different proving techniques
- is able to evaluate and justify whether simple statements are true or false
- is able to understand and read text containing mathematical notation
- knows the basic definitions and concepts related to set theory and functions

Contents:
The course in an introduction to mathematical deduction and introduces different types of proof techniques. Special attention is paid to mathematical reading and writing skills and justifying reasoning. Main concepts in this course are basic set theory and functions.

Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
Lectures 28 h, exercises 14 h

Target group:
Major and minor students
Prerequisites and co-requisites:
-
Recommended optional programme components:
-
Recommended or required reading:
Lecture notes
Assessment methods and criteria:
Exercises and final exam.
Grading:
Pass/Fail
Person responsible:
Topi Törmä
Working life cooperation:
No

761115P: Laboratory Exercises in Physics 1, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opettajat: Lauri Hautala

Opintokohteen kielet: Finnish

Leikkaavuudet:

761121P	Physical Measurements I	3.0 op
761121P-01	Physical measurements I, exam	0.0 op
761121P-02	Physical measurements I, lab. exercises	0.0 op
800149P	Introduction to LateX	2.0 op

ECTS Credits:
5 ECTS credits / 135 hours of work
Language of instruction:
Finnish
Timing:
Spring term, periods 3 and 4
Learning outcomes:
The student can safely make physical measurements, use basic measurement tools, read different scales, handle the data, calculate the error estimations and make a sensible report of the laboratory measurements.
Contents:
The skill of measuring is important for physicists. This is an introductory course on how to make physical measurements and how to treat the measured data. Laboratory works are made in groups. Laboratory safety is also an essential part of physical measurements. Measurements are made with different instruments. As a result, the most probable value is determined as well as its error. The skills obtained during this course can be applied in the subsequent laboratory courses Laboratory exercises in physics 2 and 3.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
12 hours of lectures, 16 hours of exercises, 107 hours of self-study.
Target group:
Students in physics degree program. Other students studying in University of Oulu can also participate to the course.
Prerequisites and co-requisites:
No specific prerequisites.
Recommended optional programme components:
The course is an independent entity and does not require additional studies carried out at the same time.
Recommended or required reading:
Study material will be announced at the beginning of the course.

Assessment methods and criteria:
The assessment is performed using exercises to be completed during the course. Further instructions will be given at the beginning of the course.
Grading:
The course utilizes a numerical grading scale 0-5 where zero stands for a fail.
Person responsible:
Lauri Hautala
Working life cooperation:
The course does not contain working life cooperation.
Other information:
Timetables, further instructions and materials can be found from the course website in Moodle (moodle.oulu.fi).

Compulsory

761115P-01: Laboratory Exercises in Physics 1, lecture and exam, 0 op

Voimassaolo: 01.01.2017 -
Opiskelumuoto: Basic Studies
Laji: Partial credit
Vastuuyksikkö: Field of Physics
Arvostelu: 1 - 5, pass, fail
Opettajat: Lauri Hautala
Opintokohteen kielet: Finnish
Leikkaavuudet:

761121P-01	Physical measurements I, exam	0.0 op
761121P-02	Physical measurements I, lab. exercises	0.0 op
761121P	Physical Measurements I	3.0 op

Ei opintojaksokuvauksia.

761115P-02: Laboratory Exercises in Physics 1, laboratory exercises, 0 op

Voimassaolo: 01.01.2017 -
Opiskelumuoto: Basic Studies
Laji: Partial credit
Vastuuyksikkö: Field of Physics
Arvostelu: 1 - 5, pass, fail
Opettajat: Lauri Hautala
Opintokohteen kielet: Finnish
Leikkaavuudet:

761121P-01	Physical measurements I, exam	0.0 op
761121P-02	Physical measurements I, lab. exercises	0.0 op
761121P	Physical Measurements I	3.0 op

Ei opintojaksokuvauksia.

761118P: Mechanics 1, 5 op

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Field of Physics
Arvostelu: 1 - 5, pass, fail
Opettajat: Aku Venhola
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 2-14. Also older and newer 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: Two midterm exams or final examination
761118P-02: Two laboratory exercises.

Grading:
Numerical grading scale 0 – 5, where 0 = fail

Person responsible:
Aku Venhola

Working life cooperation:
No work placement period

761108P: Physical world view, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

761112P Physical world view 3.0 op

ECTS Credits:
5 ECTS credits / 133 hours of work
Language of instruction:
Finnish
Timing:
Autumn
Learning outcomes:
After the course student can see the position of physics in the advancement of scientific world view and technology. The student has a comprehensive view of different learning and studying methods (s)he can use later on.
Contents:
The forming of key concepts in physics, using models and observations in advancing both classical and modern physics. The meaning of applying physics in modern society. Getting to know different areas of physics research and employment opportunities for physicists.
Mode of delivery:
Multiform teaching
Learning activities and teaching methods:
48 h face-to-face teaching, 85 h independent work including course work and group work
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:
Feynman, R. The Character of Physical Law, Penguin Books 1992 (or equivalent, there are several prints). The original Massenger Lectures by Richard Fenyman in 1965 (7x55min) can be found online with search "Richard Feynman messenger lectures".
Assessment methods and criteria:
Passed course work or final exam
Grading:
Numerical grading scale 0-5, where 0 = fail
Person responsible:
Pauli Väisänen
Working life cooperation:
No work placement period

477013P: Introduction to Process and Environmental Engineering, 5 op

Voimassaolo: 01.12.2016 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Process and Environmental Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Eetu-Pekka Heikkinen

Opintokohteen kielet: Finnish

ECTS Credits:
5 cr / 135 hours of work.
Language of instruction:
Finnish
Timing:
The course is held in the autumn semester, during periods I and II. It is recommended to complete the course at the 1st autumn semester.
Learning outcomes:
Students can examine industrial processes using the methods and perspectives of process and environmental engineering (e.g. unit operations, material management, phenomenon-based considerations, automation, energy and environment) and they recognize the role of different areas of the process and environmental engineering, when these areas are considered in more detail in the forthcoming courses.

Contents:
1. Unit operations. 2. Material balances. 3. Phenomenon-based considerations. 4. Material transport. 5. Process control and automation. 6. Principles in use, planning and protection of water and land resources: primary production, municipalities and industry. 7. Energy systems. 8. Productive activity as a part of society.
Mode of delivery:
Classroom education
Learning activities and teaching methods:
Pair exercises and contact-education that supports these exercises. The amount of classroom education is 16-32 hours the rest being studying independently. Only in Finnish.
Target group:
Students of process and environmental engineering
Prerequisites and co-requisites:
No prerequisities.
Recommended optional programme components:
This course is an introduction to the other courses of process and environmental engineering. Additionally, this course has connections to the course of Technical communication (900060A). It is recommended to complete these courses simultaneously if possible.
Recommended or required reading:
Material will be distributed during lectures and via courses www-site. Students are required to acquire additional material for the exercises.
Assessment methods and criteria:
This course utilizes continuous assessment. During the course, there are eight exercises that are made as pair-work. Please note that the course is not organised in English.
Grading:
The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.
Person responsible:
university lecturer Eetu-Pekka Heikkinen
Working life cooperation:
There is no direct working life cooperation in this course.
Other information:
It is highly recommended that the students are present already in the first lecture, since it is not possible to come along after the course has already begun.

477221A: Material and Energy Balances, 5 op

Voimassaolo: 01.08.2019 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Process and Environmental Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Marja Mikola

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay477231A	Material and Energy Balances I (OPEN UNI)	2.0 op
ay477232A	Material and Energy Balances II (OPEN UNI)	3.0 op
ay477221A	Material and Energy Balances (OPEN UNI)	5.0 op
477201A	Material and Energy Balances	5.0 op
470220A	Fundamentals of Chemical Process Engineering	5.0 op

ECTS Credits:
5 ECTS /133 hours of work
Language of instruction:
Finnish. The course can be completed in English as a book examination.

Timing:
Spring periods 3 and 4.
Learning outcomes:

The student is able to formulate material and energy balances for a process by taking into account the restrictions set by reaction stoichiometry. The student knows how the created mathematical formulation can be exploited in process consideration.
Contents:
Formulation of material and energy balances by taking into account the effects of chemical reactions. Multiunit cases are also considered.
Mode of delivery:
Lectures and group exercise
Learning activities and teaching methods:
Lectures 40h, group work 10h and self-study 80h
Target group:
Bachelor students in of Process or Environmental Engineering, minor subject students in relevant disciplines.
Prerequisites and co-requisites:
High school level chemistry, mathematics and physics.
Recommended optional programme components:
The course is part of a stream that aims at skills needed in the phenomenon-based modelling and planning of industrial processes.
Recommended or required reading:
Reklaitis, G.V.: Introduction to Material and Energy Balances. John Wiley & Sons, 1983. ISBN 0-471-041319.
Assessment methods and criteria:
During the course, there are two intermediate exams and both of them must be passed. Alternatively student can participate in final exam after the course. In addition to this, the students will be making a group exercise, which will be evaluated.
Person responsible:
Juha Ahola
Other information:
This course replaces the course 477201A Material and Energy Balances, 5 ects.

477222A: Reactor Analysis, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Process and Environmental Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Marja Mikola

Opintokohteen kielet: Finnish

Leikkaavuudet:

477202A	Reactor Analysis	4.0 op

ECTS Credits:
5 ECTS /133 hours of work
Language of instruction:
Finnish
Timing:
Period 2 (autumn term)
Learning outcomes:
By completing the course the student is able to explain the determination methods of the reaction rate from experimental data and he/she can illustrate the basics of deterministic modelling. On that basis, the student has skills to analyse the behaviour of ideal reactors and to perform initial reactor selection and sizing.
Contents:
Elementary reactions, kinetics of homogenous reactions. Reaction rate on the basis of experimental data. Modelling of ideal reactors. Yield, selectivity and reactor size. Heuristics for selecting reactor type and operating conditions.
Mode of delivery:
Lectures and small group exercises
Learning activities and teaching methods:
Lectures about 30 h, exercises about 10 h and self-study about 90 h.
Target group:
Bachelor students in process and environmental engineering, minor subject students
Prerequisites and co-requisites:

Objectives of Material and Energy Balances and Thermodynamic Equilibrium
Recommended optional programme components:
-
Recommended or required reading:
Lecture handouts
Levenspiel, O.: Chemical Reaction Engineering. John Wiley & Sons, 1972. or newer (parts)
Atkins, P.W.: Physical Chemistry, Oxford University Press, 2002. 7. edition or newer (parts)
Assessment methods and criteria:
Two midterm exams during the course, which can be replaced with final exam after the course and two exercises.
Grading:
The course unit utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.
Person responsible:
Marja Mikola
Working life cooperation:
No
Other information:
-

771117P: Basic course in mineralogy, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opettajat: Pekka Tuisku

Opintokohteen kielet: Finnish

ECTS Credits:
5 ects
Person responsible:
Pekka Tuisku

771113P: Introduction to Geology I, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Strand

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay771113P Introduction to Geology I (OPEN UNI) 5.0 op

ECTS Credits:
5 credits
Language of instruction:
Finnish
Timing:
1st year autumn
Learning outcomes:
Stdents have an understanding of the basic concepts of the Earth, from its composition and internal *structure* to the geological *processes* that has led to its evolution the present Earth as part of the solar system. They can tell how endogenic processes in the mantle and crust produce magmas and how magmas produce different igneous rock type upon emplacement below and on the Earth's surface. Students are able to recognise and classify common igneous rocks based on their mineral composition and are familiar with common metamorphic rocks and know the metamorphic facies concepts. They can relate deformation and metamorphism of the rocks to plate tectonic

processes.

Contents:
Evolution of the Earth as part of the solar system, structure and composition of the Earth. Classification of igneous rocks, magmatism, origin and crystallisation of magmas, volcanism, metamorphism and formation of metamorphic rocks, plate tectonics and deformation structures.
Mode of delivery:
Face to face
Learning activities and teaching methods:
36 h lectures, 6 h exercises
Target group:
1st year geoscience students. The course is a good minor subject course for others.
Prerequisites and co-requisites:
Basic course in mineralogy (771102P) is parallel to this course.
Recommended optional programme components:
This course is intended as an introduction to the scope and methods of igneous and metamorphic petrology.
Recommended or required reading:
Martti Lehtinen, Pekka Nurminen and Tapani Rämö (1998) Suomen kallioperä – 3000 vuosimiljoonaa. Suomen Geologinen Seura, Gummerus Jyväskylä, ISBN 952-90-9260-1, Chapters 2-3. John Grotzinger & Thomas H. Jordan (2010 or 2014) Understanding Earth, 6 th or 7 th edition, Chapters 1-4, 6-7, 9-10, 12.
Assessment methods and criteria:
Written examination and identification test of rock types.
Grading:
5-1/fail
Person responsible:
Kari Strand
Working life cooperation:
No

771114P: Introduction to Geology II, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opettajat: Juha Pekka Lunkka

Opintokohteen kielet: Finnish

ECTS Credits:
5 ECTS / 133 hours of work
Language of instruction:
Finnish
Timing:
1st year autumn
Learning outcomes:
Upon completion of the course, students should have acquired basic knowledge on the concepts and processes of surficial geology. Students should also be able to identify basic sediment types and soils.
Contents:
Basic concepts of surficial physical geology, weathering, erosion, sedimentation, and sediment types, soils and geological processes forming sedimentary deposits.
Mode of delivery:
Face to face teaching
Learning activities and teaching methods:
16 h lectures, 8 h exercises
Target group:
1st year Geoscience students. The course is a good minor subject course for others.
Prerequisites and co-requisites:
No
Recommended or required reading:

Handouts and John Grotzinger & Thomas H. Jordan (2010 or 2014) Understanding Earth, 6th or 7th edition, Chapters 5, 8, 15-21.
The availability of the literature can be checked from this link.
Assessment methods and criteria:
Obligatory exercises and written examination
Grading:
5-1/fail
Person responsible:
Juha Pekka Lunkka and Tiina Eskola
Working life cooperation:
No

771116P: Introduction to Quaternary deposits of Finland and their resources, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opettajat: Juha Pekka Lunkka

Opintokohteen kielet: Finnish

ECTS Credits:
5 ECTS / 133 hours of work
Language of instruction:
Finnish
Timing:
1st year spring
Learning outcomes:
Students can describe the main features and raw material resources of the Finnish Quaternary deposits.
Contents:
Main features and raw material resources of the Finnish Quaternary deposits and their origin.

Mode of delivery:
Face to face teaching
Learning activities and teaching methods:
22 h lectures. In addition, a one-day field trip is organized in May for major subject students.

Target group:
1st year Geoscience students. The course is a good minor subject course for others.
Prerequisites and co-requisites:
Introduction to Geology II (771114P) or equivalent knowledge

Recommended or required reading:
Veli-Pekka Salonen, Matti Eronen, Matti Saarnisto (2002) Käytännön maaperägeologia, 236 s.
The availability of the literature can be checked from this link.
Assessment methods and criteria:
Written examination

Grading:
5-1/fail
Person responsible:
Juha Pekka Lunkka
Working life cooperation:
No

771115P: Introduction to bedrock geology of Finland and ore geology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Strand

Opintokohteen kielet: Finnish

ECTS Credits:
5 credits
Language of instruction:
Finnish
Timing:
1st year spring
Learning outcomes:
Students can describe and recognise the main geological unist of the Finnish bedrock and nane them based on their stratigraphic position and age relations. They can connect the major geological units to the main stages of the plate tectonic evolution. Students are familiar with most common ore types and industrial minerals occurring in the bedrock and the principal processes leading to their formation and how they are explored.
Contents:
Lithostratigraphical units, the Archaean and Palaeoproterozoic bedrock of Finland and younger rock formations. Mineral resources, their classification and origin, exploration methods.
Mode of delivery:
Face to face
Learning activities and teaching methods:
24 h lectures. In addition, a one-day field trip is organized in May for major subject students.
Target group:
Major and minor subject students starting studies in geology.
Prerequisites and co-requisites:
Basic course in mineralogy (771102P), Introduction to Geology I (771113P), Introduction to Geology II (771114P) or equivalent knowledge.
Recommended or required reading:
Material given during the lectures and Lehtinen, M., Nurmi, P., Rämö, T. (1998) Suomen kallioperä – 3000 vuosimiljoonaa. Suomen Geologinen Seura, Gummerus Jyväskylä, ISBN 952-90-9260-1, p. 94-324 (available on webpages of Suomen Geologisen Seura). Parts of Craig, J.R., Vaughan, D.J. & Skinner, B.J. (1996) Resources of the Earth - Origin, Use, and Environmental Impact. Prentice Hall, 472 p.
Assessment methods and criteria:
Written examination.
Grading:
5-1/fail
Person responsible:
Eero Hanski
Working life cooperation:
No

780699S: Maturity Test, 0 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:
0 credits / 3 hours of work
Language of instruction:
Finnish or English
Timing:
5th year
Learning outcomes:

Upon completition of the essay-type maturity test the student has shown that he/she has knowledge of the topic of the research area.

Contents:
Maturity test will be agreed with the responsible person of the Master's Thesis. For the Maturity test can be accepted an abstract from Master's Thesis.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
The abstract from The Master's Thesis.
Target group:
Chemistry, compulsory
Prerequisites and co-requisites:
Master's Thesis
Recommended optional programme components:
The course is an independent entity and does not require additional studies carried out at the same time.
Recommended or required reading:
Master's Thesis
Assessment methods and criteria:
The abstarct from the Master's Thesis.
Grading:
The course utilizes verbal grading scale pass/fail.
Person responsible:
Matti Niemelä
Working life cooperation:
No
Other information:
Responsible teachers for the course: Chemistry Degree program Professors, Docents, Lectures and Doctor level researchers.

781635S: Master's Thesis in Analytical Chemistry, 20 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
20 credits / 534 hours of work
Language of instruction:
Finnish, English on demand
Timing:
5th autumn, beginning
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
534 hours of literature research
Target group:
Chemistry, Chemistry teachers, compulsory
Recommended or required reading:
Instructions given by the supervisor
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:
Matti Niemelä
Working life cooperation:
No
Other information:

Responsible teachers for the course: Chemistry Degree program Professors, Docents, Lectures and Doctor level researchers.

781602S: Master's Thesis in Inorganic Chemistry, 20 op

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
20 credits / 534 hours of work
Language of instruction:
Finnish, English on demand
Timing:
5th autumn, beginning
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
534 hours of literature research
Target group:
Chemistry, Chemistry teachers, compulsory
Recommended or required reading:
Instructions given by the supervisor
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:
Matti Niemelä
Working life cooperation:
No
Other information:
Responsible teachers for the course: Chemistry Degree program Professors, Docents, Lectures and Doctor level researchers.

782602S: Master's Thesis in Physical Chemistry, 20 op

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
20 credits / 534 hours of work
Language of instruction:
Finnish, English on demand
Timing:
5th autumn, beginning
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
534 hours of literature research
Target group:
Chemistry, Chemistry teachers, compulsory
Recommended or required reading:
Instructions given by the supervisor
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.

Person responsible:
Matti Niemelä
Working life cooperation:
No
Other information:
Responsible teachers for the course: Chemistry Degree program Professors, Docents, Lectures and Doctor level researchers.

783602S: Master's Thesis in Organic Chemistry, 20 op

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
20 credits / 534 hours of work
Language of instruction:
Finnish, English on demand
Timing:
5th autumn, beginning
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
534 hours of literature research
Target group:
Chemistry, Chemistry teachers, compulsory
Recommended or required reading:
Instructions given by the supervisor
Person responsible:
Matti Niemelä
Working life cooperation:
No
Other information:
Responsible teachers for the course: Chemistry Degree program Professors, Docents, Lectures and Doctor level researchers.

780682S: Master's Thesis in Applied Chemistry, 20 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
20 credits / 534 hours of work
Language of instruction:
Finnish, English on demand
Timing:
5th autumn, beginning
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
534 hours of literature research
Target group:
Chemistry, Chemistry teachers, compulsory

Recommended or required reading:
Instructions given by the supervisor
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:
Matti Niemelä
Working life cooperation:
No
Other information:
Responsible teachers for the course: Chemistry Degree program Professors, Docents, Lectures and Doctor level researchers.

050124A: Advanced Practice, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 ECTS
Language of instruction:
Finnish
Learning outcomes:
Having completed the study module, the student knows how to

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

Contents:
The study module includes the following:

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

Mode of delivery:
Supervised teaching practice in the basic education grades 7–9 and in the upper secondary school at the Oulu Teacher Training School.
Face-to-face teaching
Learning activities and teaching methods:
5 credits = 135 lessons (45 minutes each), out of which 50 lessons (45 min each) of face-to-face teaching and 85 lessons (45 min each) of independent work.
Face-to-face teaching:

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

Target group:
Students in the secondary teacher education programme
Prerequisites and co-requisites:
Subject didactics
Basic practice

Education as an Object of Scientific Research
Recommended optional programme components:
The study module is part of the pedagogical studies in secondary teacher education.
Recommended or required reading:
To be agreed on at the start of the study module.
Assessment methods and criteria:
Pass
A pass for the study module requires observance of the given programme at a level corresponding to the grade “good” and participation in the information meetings, lectures, supervision sessions and events to be announced separately. The study module calls for good mastery of the subjects to be taught by the student. The assessment criteria focus on commitment, interaction, goal-orientedness and assessment.
Fail
The student’s performance is deficient or does not show any accomplishment in line with the expected learning outcomes of the study module.
Grading:
Pass/fail
Person responsible:
Katja Leinonen and Emilia Manninen
Working life cooperation:
Non

050121A: Basic Practice, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 ECTS
Language of instruction:
Finnish
Learning outcomes:
Having completed the study module, the student knows how to

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

Contents:

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

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

Learning activities and teaching methods:

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

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

Target group:
Secondary teacher education students
Prerequisites and co-requisites:
Subject didactics
Education as an Object of Scientific Research
Recommended optional programme components:
The study module is part of the pedagogical studies in secondary teacher education
Recommended or required reading:
To be agreed on at the start of the study module
Assessment methods and criteria:

Pass
To pass the course the student shall successfully follow the programme assigned to him/her and attend the information meeting, lectures, supervision sessions and any specifically required events. Passing the course requires mastery of the subjects taught by the student. The assessment criteria focus on commitment and interaction.
Fail
The student's performance in the study module is deficient or does not show accomplishment in line with the expected learning outcomes.

Grading:
Pass/fail
Person responsible:
Katja Leinonen and Emilia Manninen
Working life cooperation:
Non

050122A: Broadly Based Subject Didactics, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 ECTS
Language of instruction:
Finnish
Learning outcomes:
Having completed the course, the student knows how to

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

Contents:

- curriculum
- preconceptions
- motivation

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

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

Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 4h
Subject didactics/Oulu Teacher Training School: small group teaching, a maximum of 10h (45 minutes each)
University subject didactics: small group teaching, 8h
Implementation of the special course: face-to-face teaching 16h, independent work 97h

Target group:
Students in the secondary teacher education programme
Recommended optional programme components:
The study module is part of the pedagogical studies for secondary teachers.
Recommended or required reading:
To be agreed on at the start of the study module.
Assessment methods and criteria:

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

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

Grading:
Pass/fail
Person responsible:
Minna Sääskilahti
Working life cooperation:
Non

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

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opettajat: Katariina Holma

Opintokohteen kielet: Finnish

Leikkaavuudet:

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

ECTS Credits:
5 ECTS credits

Language of instruction:
Finnish
Timing:
1st year
Learning outcomes:
- identify basic concepts and approaches in education
- identify the main research areas of educational research
- describe the main traditions and research approaches in education
- apply educational concepts and research findings in describing and analyzing educational practices

Contents:
- Orientation to basic studies in educational sciences
- Specific features of scientific knowledge
- Specific features of educational research
- Education as a professional practice and research subject

Mode of delivery:
Teaching and independet study
Learning activities and teaching methods:
Basic part: 3 ECTS: Mutual Lectures 14 h, independent Work 67h.
Seminar part: 2 ECTS: seminar groups in training programs 10 h, Independent Work 44 h.
Target group:
Students in Education from different training programs
Prerequisites and co-requisites:
No
Recommended optional programme components:
The course is part of basic studies in education
Recommended or required reading:
- Siljander, P. (2014). Systemaattinen johdatus kasvatustieteeseen: Peruskäsitteet ja pääsuuntaukset. Tampere: Vastapaino. (myös Ellibs) or literture agreed with the teacher in charge
- Training program-specific study materials
Assessment methods and criteria:
Basic part 3 op
Requirements: Active participation in lectures and independent study of the study material. Written assignment.
Seminar Part 2 ECTS
Requirements: Active participation in seminars. Tasks given by the seminar teacher. The achievement of learning outcomes is assessed on the basis of a written assignment.

To pass the course, the student has to be able to summarize the key themes, concepts and research topics relevant to educational research, and to consider their significance in educational practices or educational research. The student is also expected to relate educational concepts and approaches to each other and apply them in analyzing practical educational situations.

Grading:
Pass/Fail
Person responsible:
Katariina Holma
Working life cooperation:
In seminar groups

410085P: Growth, Development and Learning, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opettajat: Hanni-Mari Muukkonen-van der Meer

Opintokohteen kielet: Finnish

Leikkaavuudet:

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

ECTS Credits:
5 ECTS credits
Language of instruction:
Finnish
Timing:
1st year
Learning outcomes:
After completing the course, the students is able to

- Define and analyse learning from the perspectives of educational psychology and research on learning
- Identify the most prominent paradigms and tasks in educational of psychology
- Apply acquired knowledge of psychological trends and theories in classroom discussions considering different learning and teaching environments
- Compare different perspectives of educational psychology focusing on age- and culture-specific aspects in education and upbringing
- Reflect on own practices as a learner and a teacher based on knowledge in educational psychology

Contents:

- Individual growth, development and learning in the context of human development, cultural-historical environment, daily life and work
- The principal tasks of educational psychology as applied, new knowledge generating and critical science
- Research traditions, main concepts and research approaches in educational psychology
- The professional applications in supporting growth

Mode of delivery:
Blended teaching
Learning activities and teaching methods:
Lectures 14h, seminars 10h, and independent study 111 h
Target group:
Students in all study programmes of Faculty of Education
Prerequisites and co-requisites:
No
Recommended optional programme components:
The course is part of Basic Studies in Education
Recommended or required reading:
Ormrod, J. E., Anderman, E. M. & Anderman, L.H. (2019). Educational Psychology: Developing Learners (10th Edition). Pearson.
Crain W. (2010). Theories of Development: concepts and applications. 6th ed. Psychology Press
Assessment methods and criteria:
Active participation, essay
Grading:
Pass/Fail
Person responsible:
Hanni Muukkonen
Working life cooperation:
Seminar phase of the course work includes observation task in educational settings.

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

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opettajat: Hanna-Maija Huhtala

Opintokohteen kielet: Finnish

Leikkaavuudet:

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

ECTS Credits:
5 ECTS
Language of instruction:
Finnish

Timing:
1st year
Learning outcomes:
Upon completion of the course, the student will be able to:
- summarize and contrast central concepts and approaches of educational philosophy
- compare international perspectives on ethics
- apply concepts related to philosophy and ethics to discuss educational tasks and relationships in global contexts
- describe their current educational philosophy and explain and illustrate their approach to professional ethics

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

Mode of delivery:
Blended teaching
Learning activities and teaching methods:
Lectures 20h, seminars 10h, and independent study 105h
Course essay
Target group:
Students in all study programmes of Faculty of Education
Prerequisites and co-requisites:
No
Recommended optional programme components:
The course is part of Basic Studies in Education
Recommended or required reading:
Freire, P. (1998). Pedagogy of Freedom: Ethics, Democracy, and Civic Courage. Oxford: Rowman & Littlefield Publishers.
Noddings, N. (2005). Challenge to care in Schools. 2 nd ed. New York: Teachers' College Press.
Assessment methods and criteria:
Active participation,
Essay
Grading:
Pass/Fail
Person responsible:
Hanna-Maija Huhtala
Working life cooperation:
Seminar phase of the course work includes observation task on field.

050123A: Research-Based Subject Didactics, 10 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
10 ECTS
Language of instruction:
Finnish
Timing:
4. year autumn, 1. period
Learning outcomes:
The student knows how to
- describe the starting-points of educational research and explain the basics of qualitative and quantitative research.
- make use of didactic research in his/her own subject and compose a thesis in subject didactics.
- choose a relevant research method for his/her study and analyze the research data.

- assess the significance of research in subject didactics for the teaching of his/her own subject and construct the thinking of an inquiring teacher.
- apply the knowledge acquired in the study related to subject didactics in supervised teaching practice.

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

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

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

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

Mode of delivery:
Face-to-face teaching, supervised teaching practices in grades 7-9 and in the upper secondary grades of the Oulu Teacher Training School, the Faculty
Learning activities and teaching methods:
Lectures 8h, methodological exercises and seminar work, a maximum of 42h, and independent work 195h, including the production of a seminar thesis, preparation to act as opponent to another thesis, and familiarization with the other theses.
In supervised teaching practice, 1 credit equals 27 lessons (45 min each) = 16–17 lessons (75 min each).
- lessons to be given: 2–3 (75 min each)
- lessons to be monitored: 3 (75 min)
- independent work

Target group:
Students in the secondary teacher education programme
Prerequisites and co-requisites:

Recommended optional programme components:
The study module is part of the pedagogical studies in secondary teacher education
Recommended or required reading:
Curricula in the Oulu Teacher Training School and the literature to be agreed on at the start of the study module

Assessment methods and criteria:
Active participation in teaching, completion of independent assignments, conducting, and acting as an opponent to, a scientific study. Active and committed involvement in supervised teaching practice and related activities.
Pass
The student's performance shows accomplishment in line with the expected learning outcomes at an acceptable level. S/he deals with the theoretical substance of the study module analytically enough, and applies it in an appropriate manner.
In supervised teaching practice, a pass requires observance of the given programme in a manner that corresponds to the grade "good". The study module calls for a good mastery of the subjects to be taught by the student, and application of didactic knowledge in the subjects. The assessment criteria focus on commitment, interaction, target orientation, assessment, and expertise.
Grading:
Pass/fail
Person responsible:
Raimo Kaasila
Working life cooperation:
Non

410087P: Sociocultural Contexts of Education, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opettajat: Vesa Puuronen

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay410087P Sociocultural Contexts of Education (OPEN UNI) 5.0 op

Voidaan suorittaa useasti: Kyllä

ECTS Credits:
5 ECTS
Language of instruction:
Finnish
Timing:
1st year
Learning outcomes:
Upon completion of the course, the student will be able to:

- use the central concepts of social sciences in educational research and analyze the related basic issues in various contexts of education and growth.
- identify, among other things, the significance of social status and gender in the discussion related to education and schooling (incl. intersectionality).
- apply social, multicultural, juridical and responsibility issues related to education and schooling in everyday life situations.
- describe the historical, socio-political and professional starting points of Finnish education system.

Contents:

- The basics of social sciences in educational research.
- The possibilities and limitations of education and growth determined by the context, i.e., culture, society and environment (incl., e.g., the political, economic and gendered points of view).
- The social, multicultural, juridical and responsibility issues related to education (incl. e.g., from the point of view of gender, sexuality and intersectionality).
- Education systems and their gender as part of the historical development of society (incl. education politics as a part of social politics).
- Gender equality politics as a part of education politics and social politics.

Mode of delivery:
Blended teaching and learning. The course is implemented in Moodle learning environment.
Learning activities and teaching methods:
Lectures 24 h, independent working 111 h.
Learning activities are composed of studying lectures (contact/online/recorded) and their materials, course literature, and carrying out the learning task (e.g., essay), which combines the contents of lectures, course literature and the phenomena of student's own life-world experiences. The learning task is sketched in Moodle workspace of the course, together with the support and guidance by peer students and teacher.
Target group:
Students in all study programmes of Faculty of Education
Prerequisites and co-requisites:
No
Recommended optional programme components:
The course is part of the Basic Studies in Education (25 ECTS)
Recommended or required reading:
Antikainen, A., Rinne, R. & Koski, L. (2000 tai myöhempi painos). Kasvatussosiologia. Jyväskylä: PS-kustannus. (myös e-kirjana)
Saresma, T., Rossi, L-M. & Juvonen, T. (toim.). (2010 tai myöhempi painos). Käsikirja sukupuoleen. Tampere: Vastapaino. (myös e-kirjana)
Assessment methods and criteria:
The adoption of learning outcomes is measured by learning task (e.g., essay), which combines the contents of lectures, course literature and the phenomena of student's own life-world experiences.
Assessment criteria of learning task are:
0 = Work is unfinished, fragmentary, and handled matters are not connected to the theme of the course. References are poorly used.
1 = Work is very superficial in relation to the theme of the course, and handled matters are disconnected from each other. References are weakly used.

2 = Work is superficial in relation to the theme of the course, and handled matters are in some places partly disconnected from each other. References are satisfactorily used.
3 = Work is structured in relation to the theme of the course, handled matters are connected to each other, and there is a visible plot in the work. Using of references is at a good level.
4 = Work is presented and structured in somewhat analytical way in relation to the theme of the course, and handled matters are well connected to each other. Using of references is mainly at a very good level.
5 = Work is presented and structured in a systematic and analytical way in relation to the theme of the course, and handled matters are connected to each other very well. Using of references is at excellent level.
Grading:
0-5
Person responsible:
Vesa Puuronen (Mervi Heikkinen and Veli-Matti Ulvinen)
Working life cooperation:
The adoption of learning outcomes of the course may contain working life cooperation, which relates to the professional contents of each student's own study programme.

050120A: Subject Didactics, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 ECTS
Language of instruction:
Finnish
Timing:
3. year, 3. period
Learning outcomes:

Having completed the study module, the student knows how to

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

Contents:

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

Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 4 h, small group teaching 34 h, independent work 95h
Target group:
Secondary teacher students
Recommended optional programme components:
The study module is part of the pedagogical studies for secondary teachers.
Recommended or required reading:
To be agreed on at the start of the study module.

Assessment methods and criteria:
Assessment may be based, among other things, on active participation in teaching, completion of independent and online assignments, visits, planning of a teaching episode, production of learning materials, diary, blog, video, examination, etc.
pass
The student's performance shows accomplishment that is in line with the expected learning outcomes on an acceptable level. S/he deals with theoretical substance analytically enough and applies it in an appropriate manner.
fail
The student's performance shows shortcomings in accomplishments based on the expected learning outcomes, or is unfinished.
Grading:
Pass/ fail
Person responsible:
Sari Harmoinen
Working life cooperation:
Non

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

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 ECTS
Language of instruction:
Finnish
Learning outcomes:
Having completed the study module, the student knows how to

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

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

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

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

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

Target group:
Students in the secondary teacher education programme.
Prerequisites and co-requisites:
Subject didactics
Basic practice
Advanced practice

Recommended optional programme components:
The study module is part of the pedagogical studies in secondary teacher education.
Recommended or required reading:
The Oulu Teacher Training School curricula
To be agreed on at the start of the study module.

Assessment methods and criteria:
Pass
A pass for the study module requires observance of the given programme at a level that corresponds to the grade “good” as well as participation in the info meetings, lectures, supervision sessions and events to be announced separately. The study module calls for good mastery of the subjects to be taught by the student. The assessment criteria focus on commitment, interaction, target orientation and assessment as well as expertise.
Fail
The student’s performance in the study module is deficient or it does not show accomplishment in line with the expected learning outcomes of the module.

Grading:
Pass/fail
Person responsible:
Katja Leinonen and Emilia Manninen
Working life cooperation:
Non

410086P: Teaching and Educational Interaction, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opettajat: Järvelä Sanna

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay410086P	Teaching and Educational Interaction (OPEN UNI)	5.0 op

ECTS Credits:
5 ECTS
Language of instruction:
Finnish. For ITE studets English
Timing:
1st year
Learning outcomes:
- Summarize the historical development of paradigms in learning sciences
- Identify the most significant paradigms of learning sciences and the most influential theorists

- Relate the different cultural circumstances on pedagogical solutions in learning and teaching situations with special focus on intercultural competence
- Discuss the possibilities offered by ICT in teaching and learning situations

Contents:

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

Mode of delivery:
Blended teaching
Learning activities and teaching methods:
Lectures 20h, seminars 10h, and independent study 105h
Target group:
Students in all study programmes of Faculty of Education
Prerequisites and co-requisites:
No
Recommended optional programme components:
The course is part of Basic Studies in Education
Assessment methods and criteria:
Active participation,
Essay
Grading:
Pass/fail
Person responsible:
Sanna Järvelä
Working life cooperation:
Seminar phase of the course work includes observation task on field.

780699S: Maturity Test, 0 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:
0 credits / 3 hours of work
Language of instruction:
Finnish or English
Timing:
5th year
Learning outcomes:
Upon completition of the essay-type maturity test the student has shown that he/she has knowledge of the topic of the research area.

Contents:
Maturity test will be agreed with the responsible person of the Master's Thesis. For the Maturity test can be accepted an abstract from Master's Thesis.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
The abstract from The Master's Thesis.
Target group:
Chemistry, compulsory
Prerequisites and co-requisites:
Master's Thesis
Recommended optional programme components:

The course is an independent entity and does not require additional studies carried out at the same time.
Recommended or required reading:
Master's Thesis
Assessment methods and criteria:
The abstarct from the Master's Thesis.
Grading:
The course utilizes verbal grading scale pass/fail.
Person responsible:
Matti Niemelä
Working life cooperation:
No
Other information:
Responsible teachers for the course: Chemistry Degree program Professors, Docents, Lectures and Doctor level researchers.

780601S: Project work, 12 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
12 ECTS credits / 240 hours of work
Language of instruction:
Finnish, English on demand
Timing:
4th autumn-spring
Learning outcomes:
After the laboratory project the student knows a research work and methods of his/her field and has readiness to perform the Pro Gradu Thesis.
Contents:
Laboratory work and written report
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
240 hours of work including laboratory research (min. 120 h practical laboratory work) and a report.
Target group:
Chemistry, compulsory
Prerequisites and co-requisites:
B.Sc. studies in chemistry including the course Research Training (780301A) complited.
Recommended optional programme components:
The course is an independent entity and does not require additional studies carried out at the same time.
Recommended or required reading:
Material given by teachers
Assessment methods and criteria:
Laboratory research and a report.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
The course utilizes verbal grading scale pass/fail.
Person responsible:
Matti Niemelä
Working life cooperation:
No
Other information:
Responsible teachers for the course: Chemistry Degree program Professors, Docents, Lectures and Doctor level researchers.

780690S: Seminar, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
3 credits / 80 hours of work
Language of instruction:
Finnish, English on demand
Timing:
5th spring
Learning outcomes:
After this course, the student can give a talk on his own research work in both national and international conferences in Finnish and English. Furthermore, he can write the summary on the presentation subject and can do self-evaluation.
Contents:
The student gives two 20 minutes presentations (15 min presentation + 5 min for questions) on scientific subjects related to the master (M.Sc.) thesis or/and the Research Project.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Students register for the course in the beginnig of autumn or spring term. Compulsory attendance.
Target group:
Chemistry, compulsory
Prerequisites and co-requisites:
the Master's Thesis, the Research Project
Recommended optional programme components:
the Master's Thesis, the Research Project
Recommended or required reading:
Material in the Master's Thesis and/or in the Research Project
Assessment methods and criteria:
Approved own seminar talks, abstracts from both presentations (1/2-1 A4 length) and self-evaluation.
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:
Minna Tiainen and Sari Tuomikoski
Working life cooperation:
No

781635S: Master's Thesis in Analytical Chemistry, 20 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
20 credits / 534 hours of work
Language of instruction:
Finnish, English on demand
Timing:
5th autumn, beginning
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
534 hours of literature research
Target group:

Chemistry, Chemistry teachers, compulsory
Recommended or required reading:
Instructions given by the supervisor
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:
Matti Niemelä
Working life cooperation:
No
Other information:
Responsible teachers for the course: Chemistry Degree program Professors, Docents, Lectures and Doctor level researchers.

781660S: Research Project in Analytical Chemistry, 30 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
30 credits / 801 hours of work
Language of instruction:
Finnish/English on the demand
Timing:
5th Autumn (beginning)
Mode of delivery:
Face-to-face teaching
Target group:
Chemistry, compulsory
Recommended or required reading:
Material given by the supervisor
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:
Matti Niemelä
Working life cooperation:
No
Other information:
Responsible teachers for the course: Chemistry Degree program Professors, Docents, Lectures and Doctor level researchers.

781602S: Master's Thesis in Inorganic Chemistry, 20 op

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
20 credits / 534 hours of work
Language of instruction:
Finnish, English on demand
Timing:
5th autumn, beginning
Mode of delivery:

Face-to-face teaching
Learning activities and teaching methods:
534 hours of literature research
Target group:
Chemistry, Chemistry teachers, compulsory
Recommended or required reading:
Instructions given by the supervisor
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:
Matti Niemelä
Working life cooperation:
No
Other information:
Responsible teachers for the course: Chemistry Degree program Professors, Docents, Lectures and Doctor level researchers.

781607S: Research Project in Inorganic Chemistry, 30 op

Voimassaolo: 01.08.2013 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
30 credits / 801 hours of work
Language of instruction:
Finnish/English on the demand
Timing:
5th Autumn (beginning)
Mode of delivery:
Face-to-face teaching
Target group:
Chemistry, compulsory
Recommended or required reading:
Material given by the supervisor
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:
Matti Niemelä
Working life cooperation:
No
Other information:
Responsible teachers for the course: Chemistry Degree program Professors, Docents, Lectures and Doctor level researchers.

782602S: Master's Thesis in Physical Chemistry, 20 op

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
20 credits / 534 hours of work
Language of instruction:

Finnish, English on demand
Timing:
5th autumn, beginning
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
534 hours of literature research
Target group:
Chemistry, Chemistry teachers, compulsory
Recommended or required reading:
Instructions given by the supervisor
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:
Matti Niemelä
Working life cooperation:
No
Other information:
Responsible teachers for the course: Chemistry Degree program Professors, Docents, Lectures and Doctor level researchers.

782607S: Research Project in Physical Chemistry, 30 op

Voimassaolo: 01.08.2013 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
30 credits / 801 hours of work
Language of instruction:
Finnish/English on the demand
Timing:
5th Autumn, beginning
Mode of delivery:
Face-to-face teaching
Target group:
Chemistry, compulsory
Recommended or required reading:
Material given by the supervisor
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:
Matti Niemelä
Working life cooperation:
No
Other information:
Responsible teachers for the course: Chemistry Degree program Professors, Docents, Lectures and Doctor level researchers.

783602S: Master's Thesis in Organic Chemistry, 20 op

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
20 credits / 534 hours of work
Language of instruction:
Finnish, English on demand
Timing:
5th autumn, beginning
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
534 hours of literature research
Target group:
Chemistry, Chemistry teachers, compulsory
Recommended or required reading:
Instructions given by the supervisor
Person responsible:
Matti Niemelä
Working life cooperation:
No
Other information:
Responsible teachers for the course: Chemistry Degree program Professors, Docents, Lectures and Doctor level researchers.

783607S: Research Project in Organic Chemistry, 30 op

Voimassaolo: 01.08.2013 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
30 credits / 801 hours of work
Language of instruction:
Finnish/English on demand
Timing:
5th Autumn, beginning
Mode of delivery:
Face-to-face teaching
Target group:
Chemistry, compulsory
Recommended or required reading:
Instructions given by the supervisor
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:
Matti Niemelä
Working life cooperation:
No
Other information:
Responsible teachers for the course: Chemistry Degree program Professors, Docents, Lectures and Doctor level researchers.

780682S: Master's Thesis in Applied Chemistry, 20 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
20 credits / 534 hours of work
Language of instruction:
Finnish, English on demand
Timing:
5th autumn, beginning
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
534 hours of literature research
Target group:
Chemistry, Chemistry teachers, compulsory
Recommended or required reading:
Instructions given by the supervisor
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:
Matti Niemelä
Working life cooperation:
No
Other information:
Responsible teachers for the course: Chemistry Degree program Professors, Docents, Lectures and Doctor level researchers.

780685S: Research Project in Applied Chemistry, 30 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
30 credits / 801 hours of work
Language of instruction:
Finnish/English on the demand
Timing:
5th Autumn (beginning)
Mode of delivery:
Face-to-face teaching
Target group:
Chemistry, compulsory
Recommended or required reading:
Material given by the supervisor
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:
Matti Niemelä
Working life cooperation:
No
Other information:
Responsible teachers for the course: Chemistry Degree program Professors, Docents, Lectures and Doctor level researchers.