Opasraportti

FTech - Field of Chemistry (2017 - 2018)

Tutkintorakenteet

B.Sc. Degree in Chemistry (Chemist) (copy) (copy)

Tutkintorakenteen tila: published

Lukuvuosi: 2017-18

Lukuvuoden alkamispäivämäärä: 01.08.2017

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

A325202: Chemistry, Intermediate Studies, 63 - 105 op
ad
781301A: Inorganic Chemistry I, 5 op
781302A: Inorganic Chemistry II, 5 op
780354A: Laboratory Course I in Inorganic Chemistry, 5 op

781303A: Physical Chemistry I, 5 op
781304A: Physical Chemistry II, 5 op
780331A: Laboratory Course I in Physical Chemistry, 5 op
781305A: Organic Chemistry I, 5 op
781306A: Organic Chemistry II, 5 op
781307A: Laboratory Course I in Organic Chemistry, 5 op
781308A: Instrumental Analysis, 5 op
780301A: Research Training, 9 op
781321A: Bachelor's Thesis, 8 op
780381A: Maturity test, 0 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
761115P-03: Laboratory Exercises in Physics 1, Introduction to LateX, 0 op
761118P: Mechanics 1, 5 op
Compulsory
761118P-01: Mechanics 1, lectures and exam, 0 op
761118P-02: Mechanics 1, lab. exercises, 0 op
761108P: Physical world view, 5 op

Process Engineering (optional)

477013P: Introduction to Process and Environmental Engineering, 5 op
477201A: Material and Energy Balances, 5 op
477222A: Reactor Analysis, 5 op

Biochemistry (optional)

Biology (optional)

Geology (optional)

771117P: Basic course in mineralogy, 5 op
Compulsory
771117P-02: Basic mineralogy, mineral identification, 0 op
771117P-01: Basic mineralogy, lectures, 0 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

Tutkintorakenteen tila: archived

Lukuvuosi: 2017-18

Lukuvuoden alkamispäivämäärä: 01.08.2017

Major Studies in Chemistry 95 cr (vähintään 95 op)

Advanced Studies in Chemistry for All (compulsory)

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

784602S: Master's Thesis in Structural Chemistry, 20 op
784607S: Research Project in Structural Chemistry, 30 op

Optional Advanced Courses in Chemistry (minimum 30 credits)

782641S: Catalysis, 5 op
782638S: Chemistry in Industrial Applications, 5 op
782640S: Chemistry of Hydrometallurgical Processes, 5 op
781657S: Experimental Design, 5 op
781627S: Main Group Chemistry, 5 op
781651S: Metrological Fundamentals of Analytical Chemistry, 5 op

783639S: Organic Chemistry III, 5 op
781658S: Surface Analytical Techniques, 5 op
782637S: Surface Chemistry, 5 op
781655S: X-Ray Crystallography, 5 op

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.

B.Sc. Degree in Chemistry (Teacher training) (copy) (copy)

Tutkintorakenteen tila: published

Lukuvuosi: 2017-18

Lukuvuoden alkamispäivämäärä: 01.08.2017

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 88 cr (vähintään 88 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 (63-65 credits)

H325202: Chemistry, Intermediate Studies (Teacher), 63 - 105 op
Compulsory
781301A: Inorganic Chemistry I, 5 op
781302A: Inorganic Chemistry II, 5 op
780354A: Laboratory Course I in Inorganic Chemistry, 5 op
781303A: Physical Chemistry I, 5 op
781304A: Physical Chemistry II, 5 op
780331A: Laboratory Course I in Physical Chemistry, 5 op
781305A: Organic Chemistry I, 5 op

781306A: Organic Chemistry II, 5 op
781307A: Laboratory Course I in Organic Chemistry, 5 op
780396A: Demonstrations in Physics and Chemistry, 2 op
781320A: Bachelor's Thesis, 9 op
780381A: Maturity test, 0 op
780301A: Research Training, 9 op

Subsidiary Entity for Subject Teacher (40-50 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

800119P: Functions and limit, 5 op
802120P: Introduction to Matrices, 5 op
806113P: Introduction to Statistics, 5 op
802151P: Introduction to mathematical deduction, 5 op
801195P: Probability Theory, 5 op

Physics

761313A: Atomic physics 1, 5 op
761119P: Electromagnetism 1, 5 op
Compulsory
761119P-01: Electromagnetism 1, lectures and exam, 0 op
761119P-02: Electromagnetism 1, lab. exercises, 0 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
761115P-03: Laboratory Exercises in Physics 1, Introduction to LateX, 0 op
761120P: Laboratory Exercises in Physics 2, 5 op
761118P: Mechanics 1, 5 op
Compulsory
761118P-01: Mechanics 1, lectures and exam, 0 op
761118P-02: Mechanics 1, lab. exercises, 0 op
761108P: Physical world view, 5 op

Information Processing Science

Other subject

Pedagogical Studies (30 credits) (vähintään 30 op)

Pedagogical Studies have to be taken 30 cr. See more closely in the curriculun of the Teacher´s Pedagogical Studies.

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
050120A: Subject Didactics, 5 op
410086P: Teaching and Educational Interaction, 5 op

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 achieved 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)

Tutkintorakenteen tila: archived

Lukuvuosi: 2017-18

Lukuvuoden alkamispäivämäärä: 01.08.2017

Major Studies in Chemistry 62 cr (vähintään 62 op)

Advanced Studies for All (compulsory)

780683S: Final Examination in Teacher Training, 7 op
780699S: Maturity Test, 0 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 in Structural Chemistry (teacher training) (compulsory)

784602S: Master's Thesis in Structural Chemistry, 20 op

Optional Advanced Studies in Chemistry (compulsory)

781650S: Atomic Spectrometric Techniques, 5 op
782641S: Catalysis, 5 op
782638S: Chemistry in Industrial Applications, 5 op
782640S: Chemistry of Hydrometallurgical Processes, 5 op
782639S: Electrochemistry, 5 op
781657S: Experimental Design, 5 op
781648S: Inorganic Structural Chemistry, 5 op
781627S: Main Group Chemistry, 5 op
781651S: Metrological Fundamentals of Analytical Chemistry, 5 op
783639S: Organic Chemistry III, 5 op
781649S: Sampling and Sample Pretreatment, 5 op
781652S: Solid State Chemistry, 5 op
784640S: Structural Chemistry I, 5 op
781658S: Surface Analytical Techniques, 5 op
782637S: Surface Chemistry, 5 op
781655S: X-Ray Crystallography, 5 op

Minor Studies (The second teaching subject) (compulsory) (vähintään 10 op)

The studies in the second teaching subject completed in the B.Sc. Degree is made up to at least 60 credits.

Pedagogical Studies (compulsory) 30 cr (vähintään 30 op)

Pedagogical Studies have to be taken 30 cr. See more closely in the curriculum of the Degree Programme in Teacher´s Pedegogical Studies.

050124A: Advanced Practice, 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
050125A: Teacher as a Researcher in Teaching Practice, 5 op

Optional Studies (vähintään 10 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.

Minor Subject (third teaching subject)

Other Optional Studies

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 on the Common European Framework of Reference scale.
Status:
This course is mandatory for students who choose English as their foreign language in the following B.Sc. degree programmes:
Faculty of Natural Sciences
•Biology
•Mathematical and Physical Sciences
•Mathematical Sciences
Faculty of Information Technology and Electrical Engineering
•Department of Information Processing Science
Faculty of Technology
•Department of Chemistry

Oulu Mining School
•Geosciences degree programme
Notes:
In Autumn 2017, English 1 is offered separately to 2nd-year students of Mathematical Sciences.

Please consult your faculty's Study Guide to establish the language requirements for your own degree program.
Required proficiency level:
English must have been the A1 or A2 language at school or equivalent English skills should have been acquired otherwise.
ECTS Credits:
2 ECTS / 54 hours of work
Language of instruction:
English
Timing:
Biology: 1st year spring term (periods 3 and 4)
Mathematical and Physical Sciences: 1st year autumn term (periods 1 and 2)
Mathematical Sciences (for students in the older programme): 2nd 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)
Information Processing Science: 2nd year autumn term (period 1) for students who begin in 2017 or later
In Spring 2018, English 1 is offered to 2nd-year students of Information Processing Science.
Learning outcomes:
By the end of the course, you are expected to

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

Contents:
The course will focus on reading strategies; these include recognising how texts are organised, identifying key points in a text, and understanding words in context. Vocabulary work in the course will focus on: a) academic vocabulary, as used in formal scientific writing, and b) using your knowledge of the meanings of parts of words (affixes) to infer meaning.
Mode of delivery:
Contact teaching and independent study
Learning activities and teaching methods:
The English 1 course is adapted to accommodate many different fields of study, and thus the materials and implementation methods of the course vary. There will be 26 hours of guided teaching events and 28 hours of independent study, either individually or in a group. A more detailed course description and list of homework tasks will be provided by the teacher.
Target group:
Faculty of Natural Sciences: Biology, Mathematical & Physical Sciences
Faculty of Information Technology and Electrical Engineering: Information Processing Science
Faculty of Technology: Chemistry
Oulu Mining School: Geosciences
Prerequisites and co-requisites:
-
Recommended optional programme components:
Students are also required to take English 2 902004Y, or English 4 902005Y, AFTER completion of this course.
Recommended or required reading:
Course materials will be provided in electronic form or will be accessible from the university library.
Assessment methods and criteria:
Student work is monitored by continuous assessment, and students are required to participate regularly and actively in all contact teaching provided. During the course, there will be three monthly tests on material covered so far. The assessment of the course is based on the learning outcomes listed above.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Pass/Fail
Person responsible:
Karen Niskanen
Working life cooperation:
-
Other information:
N.B. Students with grades *laudatur* or *eximia* in their A1 English school-leaving examination can be exempted from this course and will be granted the credits. Please contact your own faculty for information.

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

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Leikkaavuudet:

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

Proficiency level:
B2/C1 on the Common European Framework of Reference scale.
Status:
This course is mandatory for students who choose English as their foreign language in the following B.Sc. degree programmes:
Faculty of Natural Sciences:
Biology
Mathematical & Physical Sciences
Mathematical Science (for 2nd year students in spring 2018)
Physical Science (for 2nd year students in autumn 2017)
Faculty of Information Technology and Electrical Engineering:
Information Processing Science (for students who began their studies before autumn 2017)
Faculty of Technology:
Chemistry
Oulu Mining School:
Geoscience degree programme

Note: Information Processing Science students who began their studies in autumn 2017 or later will take English 4 instead.
Please consult your faculty's study guide to establish the language requirements of your own degree programme.
Required proficiency level:
Students taking this course must have had English as the A1 or A2 language at school or have equivalent skills. The course English 1 (902002Y) is a pre-requisite, unless exempted.
ECTS Credits:
2 ECTS credits / 54 hours work.
Language of instruction:
English
Timing:
Biology: 2nd year autumn term (periods 1 and 2)
Mathematic and Physical Sciences 1st year spring term (periods 3 and 4)
Mathematics: 2nd year spring term (for the last time in spring 2018) (periods 3 and 4)
Physics: 2nd year autumn term (for the last time in autumn 2017) (periods 1 and 2)
Information Processing Science: 2nd year autumn term (for the last time in autumn 2017) (periods 1 and 2)
Chemistry: 2nd year spring term (periods 3 and 4)
Geosciences: 2nd year spring term (periods 3 and 4)
Learning outcomes:
By the end of the course, you are expected to have demonstrated the ability to:

- **use appropriate strategies and techniques for communicating effectively** in English in an academic context
- **prepare and present scientific subjects** to your classmates, using appropriate field-related vocabulary.

Contents:
Skills in listening, speaking, and presenting academic topics are practised in the classroom, where there is an emphasis on working in pairs and small groups. Homework is given to support the classroom learning.
Mode of delivery:
Contact teaching
Learning activities and teaching methods:

The English 2 course is tailored to the needs of students in different fields of study, and thus the materials and implementation methods of the course vary between groups. The teacher will provide a more detailed schedule and list of homework tasks. There will be 26 hours of guided teaching events and 28 hours of independent work, including both individual and group work.
Individual learning methods: autonomous learning tasks, practice in lecture listening and written tasks in preparation for classroom lessons
Group work: Preparation of presentations in groups

Target group:
2nd year students of Biology, Chemistry, Geoscience, Information Processing Science (older programme)
1st year students of Mathematical and Physical Sciences (new programme)
2nd year students of Mathematical Science (older programme)
2nd year students of Physical Sciences (older programme)
Prerequisites and co-requisites:
Pre-requisite course: 902002Y Englannin kieli 1
Recommended optional programme components:
-
Recommended or required reading:
-
Assessment methods and criteria:
Continuous assessment is based on regular attendance, active participation in all lessons and the successful completion of all homework tasks.
The assessment of the course is based on the learning outcomes of the course.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Pass / fail.
Person responsible:
Karen Niskanen
Working life cooperation:
-
Other information:
-

030005P: Information Skills, 1 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Technology

Arvostelu: 1 - 5, pass, fail

Opettajat: Ursula Heinikoski

Opintokohteen kielet: Finnish

Leikkaavuudet:

030004P	Introduction to Information Retrieval	0.0 op

ECTS Credits:
1 ECTS credits
Language of instruction:
Finnish
Timing:
Architecture 3. spring semester, period I; biochemistry 3. autumn semester; biology 3. autumn semester, period I; chemistry 3. autumn semester, period II; computer science and engineering 2. spring semester, period IV; electrical engineering 3. spring semester, period III; geosciences 2. spring semester, period IV; geography 1. and 3. spring semester, *period III;* industrial engineering and management 3. year*;* information processing sciences 1. year; mathematics and physics 1. spring semester; mechanical engineering 3. year; mining engineering and mineral processing 3. year; process and environmental engineering 1. year, period I. 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 RefWorks reference management tool.
Mode of delivery:
Blended teaching: classroom training, web-based learning material and exercises, a group assignment.
Learning activities and teaching methods:
Training sessions 8 h, group working 7 h, self-study 12 h
Target group:
Compulsory for all bachelor degree students of Faculty of information technology and electrical engineering, Faculty of Technology, Oulu mining school, Oulu School of architecture and Faculty of science. Optional for students of biochemistry. Compulsory also for the Master's degree students in Industrial Engineering and Management who have not earlier studies in information skills.

Prerequisites and co-requisites:
-
Recommended optional programme components:
-
Recommended or required reading:
Web learning material Tieteellisen tiedonhankinnan opas http://libguides.oulu.fi/tieteellinentiedonhankinta
Assessment methods and criteria:
Passing the course requires participation in the training sessions and successful completion of the course assignments.
Grading:
pass/fail
Person responsible:
Ursula Heinikoski
Working life cooperation:
-
Other information:
-

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 of four modules: The programme of orientation week, The tours in the chemistry research units, Orientation in small groups, and PSP (Personal Study Plan).
Mode of delivery:
Face-to-face teaching, compulsory
Learning activities and teaching methods:

The programme of the orientation week and the tours in the Chemistry research units, Orientation in small groups: 10-15 hours of visits and discussions with the group tutor. Making of PSP (Personal Study Plan) (in weboodi).
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, the tours in the chemistry research units, small group meetings, and making a Personal Study Plan for B.Sc. Degree (and M.Sc. Degree).
Read more about assessment criteria at the University of Oulu webpage.
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 the four 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

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

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 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:

32 hours of lectures and applications, 20 hours of exercises and 82 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:

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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 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:

36 hours of lectures and applications, 22 hours of exercises, 76 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:

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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 credits / 134 hours of work

Language of instruction:

Finnish. Book-examination in English as well.

Timing:

1st autumn and 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., Hart, D.J. and Craine, L.E.: Organic Chemistry: A Short Course, 10 th ed. or the newer edition, Houghton Mifflin Boston, 1999; Hart, H., Hart, D.J. and Craine, L.E.: Study Guide & Solutions Book, Organic Chemistry: A Short Course, 10th ed. or the newer edition, Houghton Mifflin Boston, 1999.

Assessment methods and criteria:

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

Grading:

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

Person responsible:

Johanna Kärkkäinen

Working life cooperation:

No

Other information:

No

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 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 + 83 hours of self-study

Target group:

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

Saarinen, H. ja Lajunen, L.H.J.: Analyyttisen kemian perusteet, 2004, Juvenes Print.

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:

Prof. Paavo Perämäki

Working life cooperation:

No

Other information:

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 and work in a group under the guidance. The student 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 tasks. Furthermore, the student can 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.

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 A (780117P) and Introduction to Organic Chemistry (780116P).

Recommended or required reading:

Instruction Book (in Finnish): Kemian perustyöt 780127P.

Assessment methods and criteria:

Accomplishment of the course requires accepted preparatory problems, laboratory exercises, problems related to them and final examination. Laboratory exercises and final examination has to be completed within next two terms.
Read more about assessment criteria at the University of Oulu webpage.

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. The exercises must be done before each laboratory assignment. Deadline of the written report is binding. Failure will lead to the renewal of the work.

A325202: Chemistry, Intermediate Studies, 63 - 105 op

Opiskelumuoto: Intermediate Studies
Laji: Study module
Vastuuyksikkö: Field of Chemistry
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

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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, 4 hours of exercises, self-study 92 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, 6 th ed., Oxford University Press, Oxford 2014. Chapters 1-4, 6, 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, 4 hours of exercises, self-study 98 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, 6 th ed., Oxford University Press, Oxford 2014. Chapters 5, 7, 8, 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 two complex compounds.

Mode of delivery:

Face-to-face teaching, compulsory

Learning activities and teaching methods:

80 hours of laboratory work, 45 hours of work reports + final examination, 9 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.
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. 75 % laboratory work and 25 % final examination.

Person responsible:

Matti Niemelä

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.

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 credits /134 hours of work

Language of instruction:

Finnish

Timing:

1st spring

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:

Properties of gases, the first and second laws of thermodynamics, physical transformations of pure substances, properties of simple mixtures, chemical equilibrium.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

56 hours of lectures + applications, 14 hours of exercises, 76 hours of self-study

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) or Introduction to Physical Chemistry (780101P) and Introduction to Inorganic Chemistry (780102P); 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:

Atkins P. and De Paula, J., Atkins' Physical Chemistry, 8. edition (2006) Chapters 1-7, or 9. edition or newest. Examination is based in the text book.

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:

Prof. Jouni Pursiainen

Working life cooperation:

No

Other information:

No

781304A: Physical 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:

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 / 134 hours of work

Language of instruction:

Finnish

Timing:

2 nd autumn

Learning outcomes:

Upon completion of the course, the student
- is familiar with basic principles of quantum mechanics
- understands the simple quantum mechanical and spectroscopic phenomena of the molecules
- can apply the basic theory in simple problems also by applying molecular symmetry.

Contents:

Introduction to quantum mechanics, electronic structures of atoms and simple molecules, molecular symmetry, group theory, electronic spectroscopy of atoms and molecules, vibrational spectroscopy.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 44 h, independent study 90 h

Target group:

Chemistry, chemistry teachers, compulsory

Prerequisites and co-requisites:

Physical chemistry I (780347A or 781303A), Mathematics for physics (763101P/766101P) or equivalent knowledge

Recommended optional programme components:

The course is independent and does not require other, simultaneous studies.

Recommended or required reading:

P. Atkins and J. de Paula, Atkins' Physical Chemistry, 10th ed., 2014, chapters 7-13.

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:

Risto Laitinen

Working life cooperation:

No

Other information:

No

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 knowledge and understanding of basic experimental methods of physical chemistry which are learned in theory in the course Physical Chemistry I.

Contents:

Calorimetric studies, distribution law, vapour pressure of solvent, partial mole volume, distillation of a mixture of liquids, crystallization of a liquid mixture, potentiometric acid-base titration, absorption, 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), 18 hours of preliminary exercises, 48 hours of laboratory experiments and written laboratory reports, one per laboratory work, 66 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, 8 th ed., Oxford University Press, 2006, partly. Or a newer edition.

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.

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 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

Other information:

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 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:

PhD Juha Heiskanen

Working life cooperation:

No

Other information:

No

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 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:

Five 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 76 h self-study and reporting

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:

Laboratory Course Manual. Clayden, J., Greeves, N., Warren, S., and Wothers, P.: Organic Chemistry, Oxford University Press, 2001 or Clayden, J., Greeves, N., Warren, S.: Organic Chemistry, Oxford University Press, 2nd edition, 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.

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 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 (780111P or 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, 6 th ed., Thomson Brooks/Cole, 2007, partly.

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:

Prof. Paavo Perämäki

Working life cooperation:

No

Other information:

No

780301A: Research Training, 9 op

Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Field of Chemistry
Arvostelu: 1 - 5, pass, fail
Opettajat: Juha Heiskanen, Matti Niemelä, Teija Kangas
Opintokohteen kielet: Finnish

ECTS Credits:

9 credits/240 hours of work

Language of instruction:

Finnish, English on demand, materials in English (partly).

Timing:

3 rd autumn-spring

Learning outcomes:

After completing this course, the student should be able to work independently in the laboratory and have ability to write a scientific report.

Contents:

Laboratory works in Inorganic Chemistry: Three laboratory projects on different fields of inorganic chemistry: ICP-OES-analysis, protonation constant, synthesis of an air sensitive compound
in Physical Chemistry: Conductivity of an electrolytic solution, adsorption of solution, rate of chemical reaction, and practical modelling work and report done in the NMR research group of Physics.
in Organic Chemistry: Three different syntheses and qualitative analysis of a mixture of three unknown compounds. Written laboratory report from each practical. Written laboratory report from each practical. 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:

In Inorganic Chemistry: Material handed out in the laboratory, in Physical Chemistry: Practical work handout. Atkins, P.W. Physical Chemistry, 7 th ed. 2002, Oxford University Press, partly and in Organic Chemistry: Clayden, J., Greeves, N., Warren, S. and Wothers, P.: Organic Chemistry, Oxford University Press, 2001., Department of Chemistry. Practical Organic Chemistry, 780332, 780389 and 780390. Laboratory Course Manual.

Assessment methods and criteria:

Laboratory works and reports.
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, Anne Heponiemi, Matti Niemelä

Working life cooperation:

No

Other information:

The reports must be returned by the given deadline, otherwise the work has to be done again.

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 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 using computer-assisted search methods
- 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. Use of SciFinder search program in the information retrieval. 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:

Face-to-face teaching

Learning activities and teaching methods:

10 h of the lectures, 6 h of the demonstrations of the search program and exercises, a poster seminar (3 h) and 6 h of the group meetings due to the preparation of candidate’s 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. 20-40 pages including ca. 30 references. The student gives a scientific presentation (20 min). The compulsory attendance at the lectures, demonstrations, group meetings 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.

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 and Lecturer Minna Tiainen. 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.

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/2 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, 2 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.

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

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

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
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:
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:
Pekka Salmi
Working life cooperation:
No
Other information:
Replaces the course 802161P Introduction to real functions.

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. periodi
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.
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 cr
Language of instruction:
Finnish
Timing:
First period at the first semester.
Learning outcomes:
After completing the course, student is:
- able to use different methods proving techniquesis
- able to use basic set theoretic concepts and definitionsis
- able to define and apply basic definitions related to functions
Contents:
The course in an introduction to mathematical deduction and introduces different types of proof techniques. The course covers the concepts familiar from upper secondary school studies more profound way. 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:
Final exam
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Pass/Fail
Person responsible:
Marko Leinonen
Working life cooperation:
-

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: Seppo Alanko

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 / 133 hours of work
Language of instruction:
Finnish
Timing:
Spring
Learning outcomes:
The student can safely make physical measurements, use different measurement tools, read different scales, handle the data, calculate the error estimations and make a sensible report of his laboratopy measurements.
Contents:
The skill to make laboratory measurements is important for physicists. This is an introductory course how to make physical measurements and how to treat the measured data. Laboratory works are made in groups. The laboratory security is an essential part also in physics. 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 other laboratory courses Laboratory exercises in physics 2 and 3.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 10 h, exercises 20 h (5 x 4 h). Five different works will be made during the course in groups. Self-study 103 h.
Target group:
For the students of the University of Oulu.
Prerequisites and co-requisites:
No specific prerequisites.
Recommended optional programme components:
800149P Introduction to LaTex
Recommended or required reading:
Lecture material is in Finnish. Work instructions are available also in English.
Assessment methods and criteria:
Written reports of the experiments and one written examination.
Grading:
Numerical grading scale 0 – 5, where 0 = fail
Person responsible:
Seppo Alanko
Working life cooperation:
No work placement period

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: Seppo Alanko
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: Seppo Alanko
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-03: Laboratory Exercises in Physics 1, Introduction to LateX, 0 op

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

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
800149P	Introduction to LateX	2.0 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
Opintokohteen kielet: Finnish
Leikkaavuudet:

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

ECTS Credits:
5 ECTS credits / 133 hours of work
- 761118P-01, Lectures and exam (4 cr)
- 761118P-02, Lab. exercises (1 cr)

Language of instruction:
The lectures will be in Finnish. The textbook is in English and exercises are selected from the textbook. For further information, contact the responsible person of the course.
Timing:
Autumn
Learning outcomes:
The student is able to describe the basic concepts of mechanics and to apply those when solving the problems related to mechanics.

Contents:
We encounter many phenomena related to mechanics in our everyday life. Most engineering sciences are based on mechanics and mechanics forms the basis of many other fields of physics, including modern physics. Contents in brief: Short summary of vector calculus. Kinematics, projectile motion and circular motion. Newton's laws of motion. Work and different forms of energy. Momentum, impulse and collisions. Rotational motion and moment of inertia. Torque and angular momentum. Rigid body equilibrium problems. Gravitation. Periodic motion. Fluid mechanics.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 30 h, 7 exercises (14 h), 2 laboratory exercises (3 hours/exercise), self-study 83 h
Target group:
For the students of the University of Oulu.
Prerequisites and co-requisites:
Knowledge of vector calculus and basics of differential and integral calculus.
Recommended optional programme components:
No alternative course units or course units that should be completed simultaneously.
Recommended or required reading:
Text book: H.D. Young and R.A. Freedman: University physics, Addison-Wesley, 13th edition, 2012, chapters 1-14. Also older editions can be used. Lecture material: Finnish lecture material will be available on the web page of the course.
Assessment methods and criteria:
Both parts (761118P-01 and 761118P-02) will be graded separately. The final grade of the course is the weighted average of the grades of part 1 (4 cr) and part 2 (1 cr).
761118P-01: Three midterm exams or final examination
761118P-02: Two laboratory exercises
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Numerical grading scale 0 – 5, where 0 = fail
Person responsible:
Juha Vaara
Working life cooperation:
No work placement period
Other information:
https://wiki.oulu.fi/display/761118P

Compulsory

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

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

766343A	Mechanics	7.0 op
761111P-02	Basic mechanics, lab. exercises	0.0 op
761111P-01	Basic mechanics, lectures and exam	0.0 op
761111P	Basic mechanics	5.0 op
761121P	Physical Measurements I	3.0 op
761101P	Basic Mechanics	4.0 op
761323A	Mechanics	6.0 op
766323A	Mechanics	6.0 op

Language of instruction:

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

Timing:

Autumn

Learning outcomes:

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

Contents:

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

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

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

Target group:

For the students of the University of Oulu

Prerequisites and co-requisites:

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

Recommended optional programme components:

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

Recommended or required reading:

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

Assessment methods and criteria:

Three small midterm exams or final examination.

Grading:

Numerical grading scale 0 – 5, where 0 = fail

Person responsible:

Juha Vaara

Working life cooperation:

No work placement period

Other information:

Course website

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

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

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

761323A	Mechanics	6.0 op
766323A	Mechanics	6.0 op

Other information:

Course website

761108P: Physical world view, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opettajat: Laura Timonen

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.
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:
Laura Timonen
Working life cooperation:
No
Other information:
https://wiki.oulu.fi/display/761112P/

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 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. Only in Finnish.
Target group:
Students of process and environmental engineering
Prerequisites and co-requisites:
None
Recommended optional programme components:
This course is an introduction to the other courses of process and environmental engineering.
Recommended or required reading:
Material will be distributed during lectures and via courses www-site.
Assessment methods and criteria:
Pair exercises. 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:
-
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.

477201A: Material and Energy Balances, 5 op

Voimassaolo: 01.08.2005 - 31.12.2019

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Process and Environmental Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Tiina Leiviskä

Opintokohteen kielet: Finnish

Leikkaavuudet:

477221A	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.
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
Prerequisites and co-requisites:
Basics from the course Introduction to Process Engineering
Recommended optional programme components:
-
Recommended or required reading:
Reklaitis, G.V.: Introduction to Material and Energy Balances. John Wiley & Sons, 1983. ISBN 0-471-04131-9.
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.
Read more about the course assessment and grading systems of the University of Oulu at www.oulu.fi/english/studying/assessment
Grading:
The course unit utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.
Person responsible:
Dr Tiina Leiviskä
Working life cooperation:
No
Other information:
-

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: Ahola, Juha Lennart

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 40h and self-study 90h
Target group:
Bachelor students in process and environmental engineering, minor subject students
Prerequisites and co-requisites:
Objectives of 477201A Material and Energy Balances and 477401A Thermodynamic Equilibrium
Recommended optional programme components:
-
Recommended or required reading:
Lecture handouts. Levenspiel, O., Chemical Reaction Engineering. John Wiley & Sons, New York, 1972 (Chapters 1-8). Atkins, P.W.: Physical Chemistry, Oxford University Press, 2002. 7th Ed. (Parts) ISBN 0-19-879285-9.
Assessment methods and criteria:
Combination of examination and group exercises
Grading:
The course unit utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.
Person responsible:
University Lecturer Juha Ahola
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

Ei opintojaksokuvauksia.

Compulsory

771117P-02: Basic mineralogy, mineral identification, 0 op

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Basic Studies
Laji: Partial credit
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opettajat: Jukka-Pekka Ranta
Opintokohteen kielet: Finnish
Voidaan suorittaa useasti: Kyllä

Ei opintojaksokuvauksia.

771117P-01: Basic mineralogy, lectures, 0 op

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Basic Studies
Laji: Partial credit
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opettajat: Pekka Tuisku
Opintokohteen kielet: Finnish
Voidaan suorittaa useasti: Kyllä

Ei opintojaksokuvauksia.

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: Eero Hanski

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

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 / 2 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
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.

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 / 200 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:
200 hours of work including laboratory research 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 ja Sari Tuomikoski
Working life cooperation:
No
Other information:
Enrolment for the course is done through WebOod.

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 work
Target group:
Chemisry, 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 work
Target group:
Chemistry, 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.

784602S: Master's Thesis in Structural 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 work
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.

784607S: Research Project in Structural 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:
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.

782641S: Catalysis, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 credits /134 hours of work

Language of instruction:
Finnish/English on demand
Timing:
4th or 5th year. The course is lectured every other year.
Learning outcomes:
Upon successful completion students should have a basic understanding of the theory of catalysis. Thermodynamic and kinetic background will be studied, including mechanisms of the most important catalytic reactions. Applications, preparation, characterisation and structure of homogenous, heterogeneous and enzymatic catalysts will be discussed.
Contents:
Principles of catalysis, homogeneous catalysis in solutions, polymer catalysis, zeolites, heterogeneous catalysis on surfaces.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
40 hours of lectures, 94 hours of self-study
Target group:
Chemistry, optional
Prerequisites and co-requisites:
Physical Chemistry I (780347A)
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:
Examination is based on the lectures.
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:
Prof. Jouni Pursiainen
Working life cooperation:
No
Other information:
No

782638S: Chemistry in Industrial Applications, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

782338A	Chemistry in Industrial Applications	5.0 op
ay782638S	Chemistry in Industrial Applications (OPEN UNI)	5.0 op

ECTS Credits:
5 credits /134 hours of work
Language of instruction:
Finnish/English on demand
Timing:
4th or 5th spring. The course is lectured every other year, next time during the spring 2018.
Learning outcomes:
Upon completion of the course, the student will be able to explain several chemical applications in process and environmental technology. In particular, the student knows the novel applications in which chemistry is used.
Contents:
Catalytic applications in water purification, catalytic oxidation, preparation of biofuels from biomass, biomass gasification and the utilisation of biogas, chemistry and chemical reactions in mining processes etc. (visiting lecturers from the companies)

Mode of delivery:
Face-to-face teaching and seminars
Learning activities and teaching methods:
40 hours of lectures, 10 hours of seminars, 84 hours of self-study
Target group:
Chemistry, optional
Prerequisites and co-requisites:
Physical Chemistry I and Physical Chemistry II
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 lecturer, scientific review papers
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:
Prof. Ulla Lassi
Working life cooperation:
No
Other information:
No

782640S: Chemistry of Hydrometallurgical Processes, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 credits /134 hours of work
Language of instruction:
Finnish, English on demand
Timing:
4th or 5th spring. The course is lectured every other year, next time during the spring 2017.
Learning outcomes:
Upon completion of the course, the student will be able to explain chemical principles of hydrometallurgical processes and phenomena. The student knows the most important chemical reactions and variables affecting hydrometallurgical processes. Process chemistry is significant in several industrial applications, and those applications are considered during the course.
Contents:
Introduction to hydrometallurgical processes, pre-treatment of concentrates (oxidation, heat treatment), principles of dissolution (including leaching and bioleaching) and purification, chemical precipitation and other metals recovery processes (extraction, ion-exchange), electrical processes and process chemistry (electrolysis, corrosion).
Mode of delivery:
Face-to-face teaching and seminars
Learning activities and teaching methods:
40 hours of lectures, 10 hours of seminars, 84 hours of self study
Target group:
Chemistry, optional
Prerequisites and co-requisites:
Physical Chemistry I and Physical Chemistry II
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 notes (in English).
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:
Prof. Ulla Lassi
Working life cooperation:
No
Other information:
No

781657S: Experimental Design, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 credits /134 hours of work
Language of instruction:
Finnish. English on demand.
Timing:
4th or 5th spring. The course is lectured every other year, next time during the spring 2016.
Learning outcomes:
After this course student becomes aware of importance experimental design and is able to apply most common experimental designs in the field of chemistry.
Contents:
Factorial designs, mixture designs, D-optimal designs, response surface methodology. Computer programmes are applied during the course in the design and analysis of experiments.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
30 hours of lectures and exercises + 103 hours of self-study incl. computer aided analysis of experimental data
Target group:
Chemistry, optional
Prerequisites and co-requisites:
Metrological Fundamentals of Analytical Chemistry (781651S)
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:
Massart, D.L., Vandeginste, B.G.M., Buydens, L.M.C., De Jong, S., Lewi, P.J. and Smeyers-Verbeke, J.: Handbook of Chemometrics and Qualimetrics: Part A, Elsevier, 1997, partly.
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:
Prof. Paavo Perämäki
Working life cooperation:
No
Other information:
No

781627S: Main Group Chemistry, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Laitinen Risto

Opintokohteen kielet: Finnish

ECTS Credits:
5 ECTS credits / 134 hours of work
Language of instruction:
Finnish / English
Timing:
4th or 5th year. Next time in the fall semester 2017.
Learning outcomes:
Upon completing the course, the student is familiar with some current aspects of main group chemistry.
Contents:
Periodic table of the elements, hydrogen, alkali metals, alaline earth metals, semi-metals and non-metals. The contents vary from year to year.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 28 hours, exercises 14 hours
Target group:
Chemist, chemistry teachers
Prerequisites and co-requisites:
Inorganic Chemistry I (780353A or 781301A) and Inorganic Chemistry II (780391A, 781302A tai 781642S)
Recommended optional programme components:
The course is independent and does not require other, simultaneous studies.
Recommended or required reading:
Overton, T., Rourke, J., Weller, M. ja Armstrong, F.: Inorganic Chemistry, 6. painos, Oxford University Press, Oxford 2014. Chapters 9-18. Lecture material.
Assessment methods and criteria:
The course will be assessed by a home 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:
Risto Laitinen
Working life cooperation:
No
Other information:
No

781651S: Metrological Fundamentals of Analytical Chemistry, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 credits /134 hours of work
Language of instruction:
Finnish
Timing:
4th or 5th autumn. The course is lectured every other year.
Learning outcomes:
Upon completion of the course, student should have acquired knowledge and understanding of most common statistical techniques that are applied in validation of analytical methods and in quality control in analytical laboratories.

Contents:
Significance tests, analysis of variance, regression methods, measurement uncertainty, validation and optimization of analytical methods.
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, optional
Prerequisites and co-requisites:
Introduction to Analytical Chemistry (780111P or 780119P)
Recommended optional programme components:
Previous 781631S Statistical Methods in Analytical Chemistry 4 credits
The course is an independent entity and does not require additional studies carried out at the same time.
Recommended or required reading:
Massart, D. L., Vandeginste, B.G.M., Buydens, L.M.C., De Jong, S., Lewi, P.J. and Smyers-Verbeke, J.: Handbook of Chemometrics and Qualimetrics: Part A, Elsevier, 1997, partly.
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:
Prof. Paavo Perämäki
Working life cooperation:
No
Other information:
No

783639S: Organic Chemistry III, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Johanna Kärkkäinen, Juha Heiskanen

Opintokohteen kielet: Finnish

ECTS Credits:
5 credits / 134 hours of work
Language of instruction:
Finnish/English on demand
Timing:
4th autumn – .
Learning outcomes:
After this course, the student is familiar with various organic chemistry reactions, can profoundly explain and analyze mechanisms, and predict reaction outcome.
Contents:
Fixed chapters from the textbook.
Mode of delivery:
Self-study
Learning activities and teaching methods:
134 hours of self study
Target group:
Chemistry, optional
Prerequisites and co-requisites:
Organic Chemistry I (780389A) and Organic Chemistry II (780393A/783643S).
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 or Clayden, J., Greeves, N., Warren, S.: Organic Chemistry, Oxford University Press, 2nd edition, 2012.

Assessment methods and criteria:
Contact the responsible teacher to arrange the final examination.
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:
Juha Heiskanen and Johanna Kärkkäinen
Working life cooperation:
No
Other information:
No

781658S: Surface Analytical Techniques, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 credits /134 hours of work
Language of instruction:
Finnish/English on demand
Timing:
4th or 5th spring. The course is lectured every other year, next time autumn 2015.
Learning outcomes:
Upon completion the student should have acquired knowledge and understanding of function of techniques and applications of them.
Contents:
Field emission scanning electron microscope, Energy filtered transmission electron microscope, Computer controlled electron probe microanalyzer and X-ray photoelectron spectroscopy, sample preparation, applications.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
50 hours of lectures, portfolio 10 hours, essay 10 hours, self-study 64 hours
Target group:
Chemistry, optional
Prerequisites and co-requisites:
Inorganic Chemistry I (780353A or 781301A)
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:
Brandon & Kaplan, Microstructural Characterization on Materials, Wiley, 2008
Assessment methods and criteria:
Problem based learning. This course unit utilizes continuous assessment. The students will be compiling a learning diary all through the course unit, and write a essay. Learning diary and essay will be assessed. The assessment of the course unit is based on the learning outcomes of the course unit. Attendance is compulsory. 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:
Lecturer Minna Tiainen
Working life cooperation:
No
Other information:
No

782637S: Surface Chemistry, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 credits /134 hours of work
Language of instruction:
Finnish/English on demand
Timing:
4th or 5th autumn. The course is lectured every other year, next time during the autumn 2017.
Learning outcomes:
Upon completion of the course, the student will be able to explain the essential phenomena of surface chemistry, such as surface tension, interfaces and surface reactions. The student knows the properties of liquid surfaces and interfaces, and the role of surface active agents. The student will be able to explain properties of surfaces and surface phenomena. The student knows the most important surface structures and methods used in surface science studies. Surface phenomena are significant in several industrial applications, and those applications are theoretically studied during the course.
Contents:
Properties of liquid-gas, liquid-liquid, solid-gas and solid-liquid interfaces. Surface structures, Surface phenomena and Surface analytical methods. A wide range of applications are considered on molecular level, such as emulsions, foams, flotation, nucleation, surface active agents.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
5O hours of lectures, 84 hours of self-study
Target group:
Chemistry, optional
Prerequisites and co-requisites:
Physical Chemistry I and Physical Chemistry II
Recommended optional programme components:
Previous courses Surface Chemistry I and Surface Chemistry II
Recommended or required reading:
Adamson, A.W.: Physical Chemistry of Surfaces, 6. painos, John Wiley & Sons, New York, 1997 (partly); Somorjai, G. A.: Introduction to Surface Chemistry and Catalysis, John Wiley & Sons, New York, 1994 (partly). Final examination is based on the lectures.
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:
Prof. Ulla Lassi
Working life cooperation:
No
Other information:
No

781655S: X-Ray Crystallography, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced 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 / English
Timing:
4th or 5th year. Next time in the fall semester 2017.
Learning outcomes:
Upon completing the course, the student is familiar with the basic principles of X-ray crystallography and is able to carry out a simple crystal structure determination.
Contents:
The production and detection of X-rays, basic principles of X-ray crystallography: unit cell, crystal systems, lattices, and space groups, basic concepts of powder diffraction and single-crystal diffraction, determination of crystal structures.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 32 hours, demonstrations 12 hours, independent work 90 hours including the the determination of a crystal structure, which will be carried out by working in pairs.
Target group:
Chemistry, chemistry teachers
Prerequisites and co-requisites:
Inorganic Chemistry I (780353A or 781301A), Inorganic Chemistry II (780391A, 781302A or 781642S)
Recommended optional programme components:
The course is independent and does not require other, simultaneous studies.
Recommended or required reading:
Massa, W.: Crystal Structure Determination, 2. painos, Springer, Berlin, 2004.
Lecture material.
Assessment methods and criteria:
The course will be assessed by a the report of the crystal structure determination.
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:
Risto Laitinen
Working life cooperation:
No
Other information:
No

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

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Proficiency level:
B2/C1 on the Common European Framework of Reference scale.
Status:
This course is mandatory for students who choose English as their foreign language in the following B.Sc. degree programmes:
Faculty of Natural Sciences
•Biology
•Mathematical and Physical Sciences
•Mathematical Sciences
Faculty of Information Technology and Electrical Engineering
•Department of Information Processing Science
Faculty of Technology
•Department of Chemistry

Oulu Mining School
•Geosciences degree programme
Notes:
In Autumn 2017, English 1 is offered separately to 2nd-year students of Mathematical Sciences.

Please consult your faculty's Study Guide to establish the language requirements for your own degree program.
Required proficiency level:
English must have been the A1 or A2 language at school or equivalent English skills should have been acquired otherwise.
ECTS Credits:
2 ECTS / 54 hours of work
Language of instruction:
English
Timing:
Biology: 1st year spring term (periods 3 and 4)
Mathematical and Physical Sciences: 1st year autumn term (periods 1 and 2)
Mathematical Sciences (for students in the older programme): 2nd 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)
Information Processing Science: 2nd year autumn term (period 1) for students who begin in 2017 or later
In Spring 2018, English 1 is offered to 2nd-year students of Information Processing Science.
Learning outcomes:
By the end of the course, you are expected to

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

Contents:
The course will focus on reading strategies; these include recognising how texts are organised, identifying key points in a text, and understanding words in context. Vocabulary work in the course will focus on: a) academic vocabulary, as used in formal scientific writing, and b) using your knowledge of the meanings of parts of words (affixes) to infer meaning.
Mode of delivery:
Contact teaching and independent study
Learning activities and teaching methods:
The English 1 course is adapted to accommodate many different fields of study, and thus the materials and implementation methods of the course vary. There will be 26 hours of guided teaching events and 28 hours of independent study, either individually or in a group. A more detailed course description and list of homework tasks will be provided by the teacher.
Target group:
Faculty of Natural Sciences: Biology, Mathematical & Physical Sciences
Faculty of Information Technology and Electrical Engineering: Information Processing Science
Faculty of Technology: Chemistry
Oulu Mining School: Geosciences
Prerequisites and co-requisites:
-
Recommended optional programme components:
Students are also required to take English 2 902004Y, or English 4 902005Y, AFTER completion of this course.
Recommended or required reading:
Course materials will be provided in electronic form or will be accessible from the university library.
Assessment methods and criteria:
Student work is monitored by continuous assessment, and students are required to participate regularly and actively in all contact teaching provided. During the course, there will be three monthly tests on material covered so far. The assessment of the course is based on the learning outcomes listed above.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Pass/Fail
Person responsible:
Karen Niskanen
Working life cooperation:
-
Other information:
N.B. Students with grades *laudatur* or *eximia* in their A1 English school-leaving examination can be exempted from this course and will be granted the credits. Please contact your own faculty for information.

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

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Leikkaavuudet:

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

Proficiency level:
B2/C1 on the Common European Framework of Reference scale.
Status:
This course is mandatory for students who choose English as their foreign language in the following B.Sc. degree programmes:
Faculty of Natural Sciences:
Biology
Mathematical & Physical Sciences
Mathematical Science (for 2nd year students in spring 2018)
Physical Science (for 2nd year students in autumn 2017)
Faculty of Information Technology and Electrical Engineering:
Information Processing Science (for students who began their studies before autumn 2017)
Faculty of Technology:
Chemistry
Oulu Mining School:
Geoscience degree programme

Note: Information Processing Science students who began their studies in autumn 2017 or later will take English 4 instead.
Please consult your faculty's study guide to establish the language requirements of your own degree programme.
Required proficiency level:
Students taking this course must have had English as the A1 or A2 language at school or have equivalent skills. The course English 1 (902002Y) is a pre-requisite, unless exempted.
ECTS Credits:
2 ECTS credits / 54 hours work.
Language of instruction:
English
Timing:
Biology: 2nd year autumn term (periods 1 and 2)
Mathematic and Physical Sciences 1st year spring term (periods 3 and 4)
Mathematics: 2nd year spring term (for the last time in spring 2018) (periods 3 and 4)
Physics: 2nd year autumn term (for the last time in autumn 2017) (periods 1 and 2)
Information Processing Science: 2nd year autumn term (for the last time in autumn 2017) (periods 1 and 2)
Chemistry: 2nd year spring term (periods 3 and 4)
Geosciences: 2nd year spring term (periods 3 and 4)
Learning outcomes:
By the end of the course, you are expected to have demonstrated the ability to:

- **use appropriate strategies and techniques for communicating effectively** in English in an academic context
- **prepare and present scientific subjects** to your classmates, using appropriate field-related vocabulary.

Contents:
Skills in listening, speaking, and presenting academic topics are practised in the classroom, where there is an emphasis on working in pairs and small groups. Homework is given to support the classroom learning.
Mode of delivery:
Contact teaching
Learning activities and teaching methods:

The English 2 course is tailored to the needs of students in different fields of study, and thus the materials and implementation methods of the course vary between groups. The teacher will provide a more detailed schedule and list of homework tasks. There will be 26 hours of guided teaching events and 28 hours of independent work, including both individual and group work.
Individual learning methods: autonomous learning tasks, practice in lecture listening and written tasks in preparation for classroom lessons
Group work: Preparation of presentations in groups

Target group:
2nd year students of Biology, Chemistry, Geoscience, Information Processing Science (older programme)
1st year students of Mathematical and Physical Sciences (new programme)
2nd year students of Mathematical Science (older programme)
2nd year students of Physical Sciences (older programme)
Prerequisites and co-requisites:
Pre-requisite course: 902002Y Englannin kieli 1
Recommended optional programme components:
-
Recommended or required reading:
-
Assessment methods and criteria:
Continuous assessment is based on regular attendance, active participation in all lessons and the successful completion of all homework tasks.
The assessment of the course is based on the learning outcomes of the course.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Pass / fail.
Person responsible:
Karen Niskanen
Working life cooperation:
-
Other information:
-

030005P: Information Skills, 1 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Technology

Arvostelu: 1 - 5, pass, fail

Opettajat: Ursula Heinikoski

Opintokohteen kielet: Finnish

Leikkaavuudet:

030004P	Introduction to Information Retrieval	0.0 op

ECTS Credits:
1 ECTS credits
Language of instruction:
Finnish
Timing:
Architecture 3. spring semester, period I; biochemistry 3. autumn semester; biology 3. autumn semester, period I; chemistry 3. autumn semester, period II; computer science and engineering 2. spring semester, period IV; electrical engineering 3. spring semester, period III; geosciences 2. spring semester, period IV; geography 1. and 3. spring semester, *period III;* industrial engineering and management 3. year*;* information processing sciences 1. year; mathematics and physics 1. spring semester; mechanical engineering 3. year; mining engineering and mineral processing 3. year; process and environmental engineering 1. year, period I. 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 RefWorks reference management tool.
Mode of delivery:
Blended teaching: classroom training, web-based learning material and exercises, a group assignment.
Learning activities and teaching methods:
Training sessions 8 h, group working 7 h, self-study 12 h
Target group:
Compulsory for all bachelor degree students of Faculty of information technology and electrical engineering, Faculty of Technology, Oulu mining school, Oulu School of architecture and Faculty of science. Optional for students of biochemistry. Compulsory also for the Master's degree students in Industrial Engineering and Management who have not earlier studies in information skills.

Prerequisites and co-requisites:
-
Recommended optional programme components:
-
Recommended or required reading:
Web learning material Tieteellisen tiedonhankinnan opas http://libguides.oulu.fi/tieteellinentiedonhankinta
Assessment methods and criteria:
Passing the course requires participation in the training sessions and successful completion of the course assignments.
Grading:
pass/fail
Person responsible:
Ursula Heinikoski
Working life cooperation:
-
Other information:
-

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 of four modules: The programme of orientation week, The tours in the chemistry research units, Orientation in small groups, and PSP (Personal Study Plan).
Mode of delivery:
Face-to-face teaching, compulsory
Learning activities and teaching methods:

The programme of the orientation week and the tours in the Chemistry research units, Orientation in small groups: 10-15 hours of visits and discussions with the group tutor. Making of PSP (Personal Study Plan) (in weboodi).
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, the tours in the chemistry research units, small group meetings, and making a Personal Study Plan for B.Sc. Degree (and M.Sc. Degree).
Read more about assessment criteria at the University of Oulu webpage.
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 the four 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

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

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 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:

32 hours of lectures and applications, 20 hours of exercises and 82 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 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:

36 hours of lectures and applications, 22 hours of exercises, 76 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 credits / 134 hours of work

Language of instruction:

Finnish. Book-examination in English as well.

Timing:

1st autumn and 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., Hart, D.J. and Craine, L.E.: Organic Chemistry: A Short Course, 10 th ed. or the newer edition, Houghton Mifflin Boston, 1999; Hart, H., Hart, D.J. and Craine, L.E.: Study Guide & Solutions Book, Organic Chemistry: A Short Course, 10th ed. or the newer edition, Houghton Mifflin Boston, 1999.

Assessment methods and criteria:

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

Grading:

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

Person responsible:

Johanna Kärkkäinen

Working life cooperation:

No

Other information:

No

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 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 + 83 hours of self-study

Target group:

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

Saarinen, H. ja Lajunen, L.H.J.: Analyyttisen kemian perusteet, 2004, Juvenes Print.

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:

Prof. Paavo Perämäki

Working life cooperation:

No

Other information:

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 and work in a group under the guidance. The student 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 tasks. Furthermore, the student can 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.

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 A (780117P) and Introduction to Organic Chemistry (780116P).

Recommended or required reading:

Instruction Book (in Finnish): Kemian perustyöt 780127P.

Assessment methods and criteria:

Accomplishment of the course requires accepted preparatory problems, laboratory exercises, problems related to them and final examination. Laboratory exercises and final examination has to be completed within next two terms.
Read more about assessment criteria at the University of Oulu webpage.

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. The exercises must be done before each laboratory assignment. Deadline of the written report is binding. Failure will lead to the renewal of the work.

H325202: Chemistry, Intermediate Studies (Teacher), 63 - 105 op

Opiskelumuoto: Intermediate Studies
Laji: Study module
Vastuuyksikkö: Field of Chemistry
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

Compulsory

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, 4 hours of exercises, self-study 92 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, 6 th ed., Oxford University Press, Oxford 2014. Chapters 1-4, 6, 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, 4 hours of exercises, self-study 98 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, 6 th ed., Oxford University Press, Oxford 2014. Chapters 5, 7, 8, 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 two complex compounds.

Mode of delivery:

Face-to-face teaching, compulsory

Learning activities and teaching methods:

80 hours of laboratory work, 45 hours of work reports + final examination, 9 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.
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. 75 % laboratory work and 25 % final examination.

Person responsible:

Matti Niemelä

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.

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 credits /134 hours of work

Language of instruction:

Finnish

Timing:

1st spring

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:

Properties of gases, the first and second laws of thermodynamics, physical transformations of pure substances, properties of simple mixtures, chemical equilibrium.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

56 hours of lectures + applications, 14 hours of exercises, 76 hours of self-study

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) or Introduction to Physical Chemistry (780101P) and Introduction to Inorganic Chemistry (780102P); 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:

Atkins P. and De Paula, J., Atkins' Physical Chemistry, 8. edition (2006) Chapters 1-7, or 9. edition or newest. Examination is based in the text book.

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:

Prof. Jouni Pursiainen

Working life cooperation:

No

Other information:

No

781304A: Physical 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:

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 / 134 hours of work

Language of instruction:

Finnish

Timing:

2 nd autumn

Learning outcomes:

Upon completion of the course, the student
- is familiar with basic principles of quantum mechanics
- understands the simple quantum mechanical and spectroscopic phenomena of the molecules
- can apply the basic theory in simple problems also by applying molecular symmetry.

Contents:

Introduction to quantum mechanics, electronic structures of atoms and simple molecules, molecular symmetry, group theory, electronic spectroscopy of atoms and molecules, vibrational spectroscopy.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 44 h, independent study 90 h

Target group:

Chemistry, chemistry teachers, compulsory

Prerequisites and co-requisites:

Physical chemistry I (780347A or 781303A), Mathematics for physics (763101P/766101P) or equivalent knowledge

Recommended optional programme components:

The course is independent and does not require other, simultaneous studies.

Recommended or required reading:

P. Atkins and J. de Paula, Atkins' Physical Chemistry, 10th ed., 2014, chapters 7-13.

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:

Risto Laitinen

Working life cooperation:

No

Other information:

No

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 knowledge and understanding of basic experimental methods of physical chemistry which are learned in theory in the course Physical Chemistry I.

Contents:

Calorimetric studies, distribution law, vapour pressure of solvent, partial mole volume, distillation of a mixture of liquids, crystallization of a liquid mixture, potentiometric acid-base titration, absorption, 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), 18 hours of preliminary exercises, 48 hours of laboratory experiments and written laboratory reports, one per laboratory work, 66 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, 8 th ed., Oxford University Press, 2006, partly. Or a newer edition.

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.

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 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

Other information:

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 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:

PhD Juha Heiskanen

Working life cooperation:

No

Other information:

No

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 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:

Five 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 76 h self-study and reporting

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:

Laboratory Course Manual. Clayden, J., Greeves, N., Warren, S., and Wothers, P.: Organic Chemistry, Oxford University Press, 2001 or Clayden, J., Greeves, N., Warren, S.: Organic Chemistry, Oxford University Press, 2nd edition, 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.

780396A: Demonstrations in Physics and Chemistry, 2 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Leena Kaila

Opintokohteen kielet: Finnish

Leikkaavuudet:

766309A Demonstrations in Physics and Chemistry 2.0 op

ECTS Credits:

2 credits / 53 hours of work

Language of instruction:

Finnish

Timing:

3rd year

Learning outcomes:

After this course the student should understand and carry out demonstrations and laboratory experiments needed when teaching physics and chemistry.

Contents:

Demonstrations and laboratory experiments in physics and chemistry.

Mode of delivery:

Face-to-face teaching, compulsory

Learning activities and teaching methods:

33 hours of demonstrations and laboratory experiments in physics and chemistry, 20 hours self-study

Target group:

Obligatory in pedagogical studies

Prerequisites and co-requisites:

No specific prerequisites

Recommended optional programme components:

To be done with the teachers pedagogical studies.

Recommended or required reading:

Material handed out during the course

Assessment methods and criteria:

Compulsory teaching and learning diary passed.
Read more about assessment criteria at the University of Oulu webpage.

Grading:

The course utilizes verbal grading scale pass/fail.

Person responsible:

Professor Ulla Lassi

Working life cooperation:

No

Other information:

No

781320A: Bachelor's Thesis, 9 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

780379A	Literature of Chemistry and Communication Skills	2.0 op
780380A	Seminar for the Degree of B.Sc.	1.0 op
780300A	Thesis for the Degree of B.Sc.	6.0 op

ECTS Credits:

8 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 using computer-assisted search methods. He/she can estimate, structure and apply the information while writing a scientific report as well as preparing a poster and oral presentation. The student can adapt the principles of the oral presentation for a talk and apply ethical principles for research and reporting. The student 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. Use of SciFinder search program in the information retrieval. 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:

Face-to-face teaching

Learning activities and teaching methods:

10 h of the lectures, 6 h of the demonstrations of the search program and exercises, a poster seminar (3 h), 6 h of the group meetings due to the preparation of candidate’s thesis and a course Information Search (8 h). 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:

Contains the course Information Search (030005P), 1 credit.

Recommended or required reading:

Lecture handout

Assessment methods and criteria:

The preparation and introduction of a poster. The thesis of ca. 20-40 pages including ca. 30 references. The student gives a scientific presentation (20 min). The compulsory attendance at the lectures, demonstrations, group meetings 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. Read more about assessment criteria at the University of Oulu webpage.

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, Lecturer Minna Tiainen and Science and Technology Library Tellus. 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.

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/2 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, 2 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.
Read more about assessment criteria at the University of Oulu webpage.

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

780301A: Research Training, 9 op

Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Field of Chemistry
Arvostelu: 1 - 5, pass, fail
Opettajat: Juha Heiskanen, Matti Niemelä, Teija Kangas
Opintokohteen kielet: Finnish

ECTS Credits:

9 credits/240 hours of work

Language of instruction:

Finnish, English on demand, materials in English (partly).

Timing:

3 rd autumn-spring

Learning outcomes:

After completing this course, the student should be able to work independently in the laboratory and have ability to write a scientific report.

Contents:

Laboratory works in Inorganic Chemistry: Three laboratory projects on different fields of inorganic chemistry: ICP-OES-analysis, protonation constant, synthesis of an air sensitive compound
in Physical Chemistry: Conductivity of an electrolytic solution, adsorption of solution, rate of chemical reaction, and practical modelling work and report done in the NMR research group of Physics.
in Organic Chemistry: Three different syntheses and qualitative analysis of a mixture of three unknown compounds. Written laboratory report from each practical. Written laboratory report from each practical. 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:

In Inorganic Chemistry: Material handed out in the laboratory, in Physical Chemistry: Practical work handout. Atkins, P.W. Physical Chemistry, 7 th ed. 2002, Oxford University Press, partly and in Organic Chemistry: Clayden, J., Greeves, N., Warren, S. and Wothers, P.: Organic Chemistry, Oxford University Press, 2001., Department of Chemistry. Practical Organic Chemistry, 780332, 780389 and 780390. Laboratory Course Manual.

Assessment methods and criteria:

Laboratory works and reports.
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, Anne Heponiemi, Matti Niemelä

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
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:
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:

Pekka Salmi
Working life cooperation:
No
Other information:
Replaces the course 802161P Introduction to real functions.

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. periodi
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.
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 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 cr
Language of instruction:
Finnish
Timing:
4th period. 1st or 2nd 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 (partly compulsory) / instructed group work (28 h) / independent work 80 h. Group works will be returned. Additional independently implemented learning diary tasks. Independent work contains also preparation for group work and peer assessment.
Target group:
Students of mathematics and physics and other interested students.
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 diaries are assessed weekly. In addition web tests. The assessment of the course is based on the learning outcomes of the course. The more detailed assessment criteria is available in the beginning of the course. In addition one compulsory lecture and peer assessment.
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 cr
Language of instruction:
Finnish
Timing:
First period at the first semester.
Learning outcomes:
After completing the course, student is:
- able to use different methods proving techniquesis
- able to use basic set theoretic concepts and definitionsis
- able to define and apply basic definitions related to functions
Contents:
The course in an introduction to mathematical deduction and introduces different types of proof techniques. The course covers the concepts familiar from upper secondary school studies more profound way. 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:
Final exam
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Pass/Fail
Person responsible:
Marko Leinonen
Working life cooperation:
-

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:
Final exam and small tests.
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 / 133 hours of work
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 and molecular 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, exercises 7, self-study 80 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 excercises, lectures, webexcercises or one final examination.
Grading:
Numerical grading scale 0 – 5, where 0 = fail
Person responsible:
Saana-Maija Huttula
Working life cooperation:
No work placement period
Other information:
Lectured for the first time in autumn 2018, period 1. Replaces the course 766326A Atomic physics 1, 6 ECTS cr.

761119P: Electromagnetism 1, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

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

Ei opintojaksokuvauksia.

Compulsory

761119P-01: Electromagnetism 1, lectures and exam, 0 op

Voimassaolo: 01.01.2017 -

Opiskelumuoto: Basic Studies

Laji: Partial credit

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish
Leikkaavuudet:

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

Ei opintojaksokuvauksia.

761119P-02: Electromagnetism 1, lab. exercises, 0 op

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

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

Ei opintojaksokuvauksia.

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: Seppo Alanko
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 / 133 hours of work
Language of instruction:
Finnish
Timing:
Spring
Learning outcomes:
The student can safely make physical measurements, use different measurement tools, read different scales, handle the data, calculate the error estimations and make a sensible report of his laboratopy measurements.
Contents:

The skill to make laboratory measurements is important for physicists. This is an introductory course how to make physical measurements and how to treat the measured data. Laboratory works are made in groups. The laboratory security is an essential part also in physics. 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 other laboratory courses Laboratory exercises in physics 2 and 3.

Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
Lectures 10 h, exercises 20 h (5 x 4 h). Five different works will be made during the course in groups. Self-study 103 h.

Target group:
For the students of the University of Oulu.

Prerequisites and co-requisites:
No specific prerequisites.

Recommended optional programme components:
800149P Introduction to LaTex

Recommended or required reading:
Lecture material is in Finnish. Work instructions are available also in English.

Assessment methods and criteria:
Written reports of the experiments and one written examination.

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

Person responsible:
Seppo Alanko

Working life cooperation:
No work placement period

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: Seppo Alanko
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: Seppo Alanko
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-03: Laboratory Exercises in Physics 1, Introduction to LateX, 0 op

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

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
800149P	Introduction to LateX	2.0 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: Seppo Alanko
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 (1/3 - 1/2 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 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). Read more about assessment criteria at the University of Oulu webpage.
Grading:
Numerical grading scale 0 – 5, where 0 = fail
Person responsible:
Seppo Alanko
Working life cooperation:
No work placement period
Other information:
https://wiki.oulu.fi/display/766106P/

761118P: Mechanics 1, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

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

ECTS Credits:
5 ECTS credits / 133 hours of work
- 761118P-01, Lectures and exam (4 cr)
- 761118P-02, Lab. exercises (1 cr)
Language of instruction:
The lectures will be in Finnish. The textbook is in English and exercises are selected from the textbook. For further information, contact the responsible person of the course.
Timing:
Autumn
Learning outcomes:
The student is able to describe the basic concepts of mechanics and to apply those when solving the problems related to mechanics.
Contents:
We encounter many phenomena related to mechanics in our everyday life. Most engineering sciences are based on mechanics and mechanics forms the basis of many other fields of physics, including modern physics. Contents in brief: Short summary of vector calculus. Kinematics, projectile motion and circular motion. Newton's laws of motion. Work and different forms of energy. Momentum, impulse and collisions. Rotational motion and moment of inertia. Torque and angular momentum. Rigid body equilibrium problems. Gravitation. Periodic motion. Fluid mechanics.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 30 h, 7 exercises (14 h), 2 laboratory exercises (3 hours/exercise), self-study 83 h
Target group:
For the students of the University of Oulu.
Prerequisites and co-requisites:
Knowledge of vector calculus and basics of differential and integral calculus.
Recommended optional programme components:

No alternative course units or course units that should be completed simultaneously.
Recommended or required reading:
Text book: H.D. Young and R.A. Freedman: University physics, Addison-Wesley, 13th edition, 2012, chapters 1-14. Also older editions can be used. Lecture material: Finnish lecture material will be available on the web page of the course.
Assessment methods and criteria:
Both parts (761118P-01 and 761118P-02) will be graded separately. The final grade of the course is the weighted average of the grades of part 1 (4 cr) and part 2 (1 cr).
761118P-01: Three midterm exams or final examination
761118P-02: Two laboratory exercises
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Numerical grading scale 0 – 5, where 0 = fail
Person responsible:
Juha Vaara
Working life cooperation:
No work placement period
Other information:
https://wiki.oulu.fi/display/761118P

Compulsory

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

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

766343A	Mechanics	7.0 op
761111P-02	Basic mechanics, lab. exercises	0.0 op
761111P-01	Basic mechanics, lectures and exam	0.0 op
761111P	Basic mechanics	5.0 op
761121P	Physical Measurements I	3.0 op
761101P	Basic Mechanics	4.0 op
761323A	Mechanics	6.0 op
766323A	Mechanics	6.0 op

Language of instruction:

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

Timing:

Autumn

Learning outcomes:

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

Contents:

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

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

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

Target group:

For the students of the University of Oulu

Prerequisites and co-requisites:

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

Recommended optional programme components:

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

Recommended or required reading:

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

Assessment methods and criteria:

Three small midterm exams or final examination.

Grading:

Numerical grading scale 0 – 5, where 0 = fail

Person responsible:

Juha Vaara

Working life cooperation:

No work placement period

Other information:

Course website

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

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

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

Other information:

Course website

761108P: Physical world view, 5 op

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opettajat: Laura Timonen

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.
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:
Laura Timonen
Working life cooperation:
No
Other information:
https://wiki.oulu.fi/display/761112P/

050121A: Basic Practice, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 ECTS
Language of instruction:
Finnish
Timing:
3. year, 4. period
Learning outcomes:
Having completed the study module, the student knows how to

- describe the meaning of a teacher's pedagogical thinking and activity and interaction in educational and teaching situations
- construct an idea of the school's activity, the learners, the teacher's work and school as a work community
- put into use in the lessons the contents of both the core curriculum and ones specific to the subject
- develop his/her capability to encounter different learners in all teaching and learning situations
- 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
Timing:
3. year, 4. period
Learning outcomes:
Having completed the course, the student knows how to

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

Contents:

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

The contents of the special course are permanent and/or annually changing courses supporting the general objectives of teachers' pedagogical studies, offered by the Teacher Training School, educational sciences, subject didactics, and subject departments. There will be an effort to organise courses in the following areas, among others: ICT, ethics, inquiring orientation in teaching and as part of professional deintity, civic skills and active citizenship, responsibility for the environment, multiculturalism and interculturalism, encountering difference, multiprofessional collaboration, functional mathematics, teaching literature and writing, etc.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 4h
Subject didactics/Oulu Teacher Training School: small group teaching, a maximum of 10h (45 minutes each)
University subject didactics: small group teaching, 8h
Implementation of the special course: face-to-face teaching 16h, independent work 97h

Target group:
Students in the secondary teacher education programme
Recommended optional programme components:
The study module is part of the pedagogical studies for secondary teachers.
Recommended or required reading:
To be agreed on at the start of the study module.
Assessment methods and criteria:
For example, active participation in teaching, completion of independent and online assignments, visit, planning of a teaching episode, production of learning materials, diary, blog, video, examination, etc.

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

Grading:

Pass/fail
Person responsible:
Minna 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: Sari Harmoinen

Opintokohteen kielet: Finnish

Leikkaavuudet:

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

ECTS Credits:
5 ECTS
Language of instruction:
Finnish. English for the ITE students
Timing:
1st year
Learning outcomes:
- Describe the main paradigms and define the basic concepts of educational sciences
- Identify some of the most influential, past and contemporary educational theorists
- Consider the role of practical and theoretical knowledge in teacher's profession
- Apply the acquired knowledge in classroom discussions on international and multicultural learning and teaching contexts
- Is able to read academic texts on education and write a short academic essay

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

Mode of delivery:
Blended teaching
Learning activities and teaching methods:
Lectures 20h, seminars 10h, and independent study 105h
Target group:
ITE, LO, Taika, Tekno, Vaka, Kako, AO, Avoin, AMOK
Prerequisites and co-requisites:
No
Recommended optional programme components:
The course is part of Basic Studies in Education
Assessment methods and criteria:
Active participation,
Essay
Grading:
Pass/Fail
Person responsible:
Sari Harmoinen

410085P: Growth, Development and Learning, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opettajat: Hanni-Mari Muukkonen-van der Meer

Opintokohteen kielet: Finnish

Leikkaavuudet:

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

ECTS Credits:
5 ECTS
Language of instruction:
Finnish
Timing:
1st year
Learning outcomes:

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

Contents:

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

Mode of delivery:
Blended teaching
Learning activities and teaching methods:
Lectures 20h, seminars 10h, and independent study 105h
Target group:
ITE, LO, Taika, Tekno, Vaka, Kako, AO, Avoin, AMOK
Prerequisites and co-requisites:
No
Recommended optional programme components:
The course is part of Basic Studies in Education
Recommended or required reading:
Theories of Development: concepts and applications. 6 th ed. 2011.
Assessment methods and criteria:
Active participation,
Essay
Grading:
Pass/Fail
Working life cooperation:
Seminar phase of the course work includes observation task on field.

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

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:
ITE, LO, Taika, Tekno, Vaka, Kako, AO, Avoin, AMOK
Prerequisites and co-requisites:
No
Recommended optional programme components:
The course is part of Basic Studies in Education
Assessment methods and criteria:
Active participation,
Essay
Grading:
Pass/fail
Person responsible:
Sanna Järvelä
Working life cooperation:
Seminar phase of the course work includes observation task on field.

780683S: Final Examination in Teacher Training, 7 op

Voimassaolo: 01.01.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
7 credits / 187 hours of work
Language of instruction:
Finnish
Timing:
5th year
Learning outcomes:
After the final examination the student extensively knows the fundamental concepts of his/her field.
Contents:
The final examination may be an oral and/or written examination. There are two teachers present in the oral examinations. The grade of the Final Examination may be improved by taking the examination again.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
187 hours of self-study
Target group:
Tearchers, compulsory
Prerequisites and co-requisites:

-
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 students of teacher training line take final examinations in two majors (3,5 cr each). The textbooks are:
Inorganic Chemistry: Cotton, F. A., Wilkinson, G. ja Gaus, P. L.: Basic Inorganic Chemistry, 3. painos, Wiley & Sons, 1995.
Physical Chemistry: Atkins P. and De Paula, J., Atkins' Physical Chemistry, Oxford University Press, Oxford, 9. painos (2009) tai uudempi.
Organic Chemistry: Clayden, J., Greeves, N., Warren, S. ja Wothers, P.: Organic Chemistry, Oxford University Press, 2. painos, 2012., (valituin osin).
Structural Chemistry: By separate agreement.
Assessment methods and criteria:
1 Final examination/major
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.

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 / 2 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

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.

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 work
Target group:
Chemisry, 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 work
Target group:
Chemistry, 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.

784602S: Master's Thesis in Structural 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 work
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.

781650S: Atomic Spectrometric Techniques, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 credits /134 hours of work
Language of instruction:
Finnish. English on demand.
Timing:
4th or 5th spring. The course is lectured every other year, next time during the spring 2017.
Learning outcomes:
Upon completion of the course, student should have acquired knowledge and understanding of AAS (especially ETAAS) and plasma based techniques (ICP-OES, ICP-MS), their theoretical background and modern instrumentation. Student is also able to describe the advantages and “weak points” of the techniques in the point of view of elements and samples to be analyzed. In addition, knowledge is acquired on the ptimization of measurement procedures and interference effects and their elimination.
Contents:
Origin of atomic absorption, atomic emission and atomic mass spectra. Instrument components and their properties, optimization of the determination procedures (incl. interference effects and their correction), and instrument diagnostics. Special sample introduction techniques and hyphenated techniques.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
30 hours of lectures and seminars + 103 hours of self-study incl. practical project work
Target group:
Chemistry, optional
Prerequisites and co-requisites:
Instrumental Analysis (780328A or 781308A)
Recommended optional programme components:
Previous 781637S Atomispektometric Methods 4 credits and 781638S ICP-MS Workshop 3 credits

Recommended or required reading:
Lajunen, L.H.J. and Perämäki, P.: Spectrochemical Analysis by Atomic Absorption and Emission, 2 nd ed., The Royal Society of Chemistry, 2004
Assessment methods and criteria:
Final examination or home assignment. 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:
Prof. Paavo Perämäki
Working life cooperation:
No
Other information:
No

782641S: Catalysis, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 credits /134 hours of work
Language of instruction:
Finnish/English on demand
Timing:
4th or 5th year. The course is lectured every other year.
Learning outcomes:
Upon successful completion students should have a basic understanding of the theory of catalysis. Thermodynamic and kinetic background will be studied, including mechanisms of the most important catalytic reactions. Applications, preparation, characterisation and structure of homogenous, heterogeneous and enzymatic catalysts will be discussed.
Contents:
Principles of catalysis, homogeneous catalysis in solutions, polymer catalysis, zeolites, heterogeneous catalysis on surfaces.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
40 hours of lectures, 94 hours of self-study
Target group:
Chemistry, optional
Prerequisites and co-requisites:
Physical Chemistry I (780347A)
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:
Examination is based on the lectures.
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:
Prof. Jouni Pursiainen
Working life cooperation:
No
Other information:
No

782638S: Chemistry in Industrial Applications, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

782338A	Chemistry in Industrial Applications	5.0 op
ay782638S	Chemistry in Industrial Applications (OPEN UNI)	5.0 op

ECTS Credits:
5 credits /134 hours of work
Language of instruction:
Finnish/English on demand
Timing:
4th or 5th spring. The course is lectured every other year, next time during the spring 2018.
Learning outcomes:
Upon completion of the course, the student will be able to explain several chemical applications in process and environmental technology. In particular, the student knows the novel applications in which chemistry is used.
Contents:
Catalytic applications in water purification, catalytic oxidation, preparation of biofuels from biomass, biomass gasification and the utilisation of biogas, chemistry and chemical reactions in mining processes etc. (visiting lecturers from the companies)
Mode of delivery:
Face-to-face teaching and seminars
Learning activities and teaching methods:
40 hours of lectures, 10 hours of seminars, 84 hours of self-study
Target group:
Chemistry, optional
Prerequisites and co-requisites:
Physical Chemistry I and Physical Chemistry II
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 lecturer, scientific review papers
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:
Prof. Ulla Lassi
Working life cooperation:
No
Other information:
No

782640S: Chemistry of Hydrometallurgical Processes, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 credits /134 hours of work
Language of instruction:
Finnish, English on demand
Timing:
4th or 5th spring. The course is lectured every other year, next time during the spring 2017.
Learning outcomes:

Upon completion of the course, the student will be able to explain chemical principles of hydrometallurgical processes and phenomena. The student knows the most important chemical reactions and variables affecting hydrometallurgical processes. Process chemistry is significant in several industrial applications, and those applications are considered during the course.
Contents:
Introduction to hydrometallurgical processes, pre-treatment of concentrates (oxidation, heat treatment), principles of dissolution (including leaching and bioleaching) and purification, chemical precipitation and other metals recovery processes (extraction, ion-exchange), electrical processes and process chemistry (electrolysis, corrosion).
Mode of delivery:
Face-to-face teaching and seminars
Learning activities and teaching methods:
40 hours of lectures, 10 hours of seminars, 84 hours of self study
Target group:
Chemistry, optional
Prerequisites and co-requisites:
Physical Chemistry I and Physical Chemistry II
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 notes (in English).
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:
Prof. Ulla Lassi
Working life cooperation:
No
Other information:
No

782639S: Electrochemistry, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 credits /134 hours of work
Language of instruction:
Finnish/English on demand
Timing:
4th or 5th autumn. The course is lectured every other year, next time during the autumn 2018.
Learning outcomes:
Upon completion of the course, the student will be able to explain the essential phenomena of electrochemistry, such as electrochemical reactions, electrolytes and related thermodynamics. The student knows the principle of electrochemical cells (batteries and fuel cells) and kinetics of electrochemical reactions. These phenomena are significant in chemical and metal industry, such as in metal recovery by electrolysis.
Contents:
Introduction to electrochemistry, electrochemical reactions and reaction kinetics, electrolytes and thermodynamics of electrolytic solutions, electrochemical cells (batteries and fuel cells), measurement methods of electrochemical properties, applications of electrochemistry.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
50 hours of lectures, 84 hours of self study
Target group:

Chemistry, optional
Prerequisites and co-requisites:
Physical Chemistry I and Physical Chemistry II
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:
Murtomäki, L., Kallio, T., Lahtinen, R. & Kontturi, K.: Sähkökemia, 2. painos, Korpijyvä Oy, Jyväskylä, 2010; Bockris, J.O´M., Reddy, A.K.N.: Modern Electrochemistry, vol 1, 2. painos, Plenum Press, New York, 1988, partly, lecture notes. Examination based on the lectures.
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:
Prof. Ulla Lassi
Working life cooperation:
No
Other information:
No

781657S: Experimental Design, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 credits /134 hours of work
Language of instruction:
Finnish. English on demand.
Timing:
4th or 5th spring. The course is lectured every other year, next time during the spring 2016.
Learning outcomes:
After this course student becomes aware of importance experimental design and is able to apply most common experimental designs in the field of chemistry.
Contents:
Factorial designs, mixture designs, D-optimal designs, response surface methodology. Computer programmes are applied during the course in the design and analysis of experiments.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
30 hours of lectures and exercises + 103 hours of self-study incl. computer aided analysis of experimental data
Target group:
Chemistry, optional
Prerequisites and co-requisites:
Metrological Fundamentals of Analytical Chemistry (781651S)
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:
Massart, D.L., Vandeginste, B.G.M., Buydens, L.M.C., De Jong, S., Lewi, P.J. and Smeyers-Verbeke, J.: Handbook of Chemometrics and Qualimetrics: Part A, Elsevier, 1997, partly.
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:
Prof. Paavo Perämäki

Working life cooperation:
No
Other information:
No

781648S: Inorganic Structural Chemistry, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 credits /134 hours of work
Language of instruction:
Finnish/English on demand
Timing:
4th spring. The course is lectured every other year, next time during the spring 2017.
Learning outcomes:
After this course the student is familiar with molecular symmetry and application of molecular symmetry in vibration spectroscopy, electronic absorption spectroscopy and in multinuclear NMR spectroscopy.
Contents:
Molecular symmetry and group theory, vibrational spectroscopy, electronic absorption spectroscopy and NMR spectroscopy.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
34 hours of lectures, 8 hours of exercises, 92 hours of self-study.
Target group:
Chemistry, optional
Prerequisites and co-requisites:
Inorganic Chemistry I (780353A or 781301A) and Inorganic Chemistry II (780391,781302A, or 781642S)
Recommended optional programme components:
Prevoius course 781639S Molecular Symmetry and Spectroscopy 5 cr. Contains also parts of the previuos course 781614S Structural Methods in Inorganic Chemistry 3 cr.
Recommended or required reading:
Rankin, D. W. H., Mitzel, N, W, ja Morrison, C. A., Structural Methods in Molecular Inorganic Chemistry, John Wiley & Sons, Ltd., Chichester, 2013.
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:
Risto Laitinen
Working life cooperation:
No
Other information:
No

781627S: Main Group Chemistry, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Laitinen Risto

Opintokohteen kielet: Finnish

ECTS Credits:
5 ECTS credits / 134 hours of work
Language of instruction:
Finnish / English
Timing:
4th or 5th year. Next time in the fall semester 2017.
Learning outcomes:
Upon completing the course, the student is familiar with some current aspects of main group chemistry.
Contents:
Periodic table of the elements, hydrogen, alkali metals, alaline earth metals, semi-metals and non-metals. The contents vary from year to year.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 28 hours, exercises 14 hours
Target group:
Chemist, chemistry teachers
Prerequisites and co-requisites:
Inorganic Chemistry I (780353A or 781301A) and Inorganic Chemistry II (780391A, 781302A tai 781642S)
Recommended optional programme components:
The course is independent and does not require other, simultaneous studies.
Recommended or required reading:
Overton, T., Rourke, J., Weller, M. ja Armstrong, F.: Inorganic Chemistry, 6. painos, Oxford University Press, Oxford 2014. Chapters 9-18. Lecture material.
Assessment methods and criteria:
The course will be assessed by a home 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:
Risto Laitinen
Working life cooperation:
No
Other information:
No

781651S: Metrological Fundamentals of Analytical Chemistry, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 credits /134 hours of work
Language of instruction:
Finnish
Timing:
4th or 5th autumn. The course is lectured every other year.
Learning outcomes:
Upon completion of the course, student should have acquired knowledge and understanding of most common statistical techniques that are applied in validation of analytical methods and in quality control in analytical laboratories.
Contents:
Significance tests, analysis of variance, regression methods, measurement uncertainty, validation and optimization of analytical methods.
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, optional
Prerequisites and co-requisites:
Introduction to Analytical Chemistry (780111P or 780119P)
Recommended optional programme components:
Previous 781631S Statistical Methods in Analytical Chemistry 4 credits
The course is an independent entity and does not require additional studies carried out at the same time.
Recommended or required reading:
Massart, D. L., Vandeginste, B.G.M., Buydens, L.M.C., De Jong, S., Lewi, P.J. and Smyers-Verbeke, J.: Handbook of Chemometrics and Qualimetrics: Part A, Elsevier, 1997, partly.
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:
Prof. Paavo Perämäki
Working life cooperation:
No
Other information:
No

783639S: Organic Chemistry III, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Johanna Kärkkäinen, Juha Heiskanen

Opintokohteen kielet: Finnish

ECTS Credits:
5 credits / 134 hours of work
Language of instruction:
Finnish/English on demand
Timing:
4th autumn – .
Learning outcomes:
After this course, the student is familiar with various organic chemistry reactions, can profoundly explain and analyze mechanisms, and predict reaction outcome.
Contents:
Fixed chapters from the textbook.
Mode of delivery:
Self-study
Learning activities and teaching methods:
134 hours of self study
Target group:
Chemistry, optional
Prerequisites and co-requisites:
Organic Chemistry I (780389A) and Organic Chemistry II (780393A/783643S).
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 or Clayden, J., Greeves, N., Warren, S.: Organic Chemistry, Oxford University Press, 2nd edition, 2012.
Assessment methods and criteria:
Contact the responsible teacher to arrange the final examination.
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.

Person responsible:
Juha Heiskanen and Johanna Kärkkäinen
Working life cooperation:
No
Other information:
No

781649S: Sampling and Sample Pretreatment, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 credits /134 hours of work
Language of instruction:
Finnish. English on demand.
Timing:
4th or 5th spring. The course is lectured every other year, next time during the spring 2017.
Learning outcomes:
After this course student becomes aware of the importance of correct sampling (especially heterogeneous solid materials). The student also gets knowledge how to i) sample and ii) prepare samples for various types of analysis: determination of total element concentrations (incl. ultra trace levels), fractionation of elements and element speciation analysis. At the end of the course the students should have also acquired an understanding of the techniques that are used in sample preconcentration and matrix separation, as well as purification of reagents and laboratory tools when very low element concentrations are measured.
Contents:
Representative sampling and sampling errors, various sample preparation techniques utilizing open and closed systems and their use in the determination of total element concentrations in inorganic and organic sample types. Fusion techniques and fire assay methods. Sample preparation in trace element fractionation and speciation analysis. Systematic errors in analysis (losses and contamination), clean rooms, separation and preconcentration techniques.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
30 hours of lectures + seminar presentation + 103 hours of self-study
Target group:
Chemistry, optional
Prerequisites and co-requisites:
Introduction to Analytical Chemistry (780111P or 780119P)
Recommended optional programme components:
Previous courses 781640S Sampling and Sample Preparation 4 cr and 781632S Determination of Trace Elements 3 cr combined.
Recommended or required reading:
Sirén, H., Perämäki, P., Laiho, J.: Esikäsittelyn käsikirja, Kemian Kustannus Oy, 2009 and material handed out by the lecturer.
Assessment methods and criteria:
Final examination or home assignment. 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:
Prof. Paavo Perämäki
Working life cooperation:
No
Other information:
No

781652S: Solid State Chemistry, 5 op

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

Ei opintojaksokuvauksia.

784640S: Structural Chemistry I, 5 op

Voimassaolo: 01.08.2011 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Field of Chemistry
Arvostelu: 1 - 5, pass, fail
Opettajat: Mattila, Sampo Antero
Opintokohteen kielet: Finnish
Leikkaavuudet:

780317A	Structural Chemistry I	5.0 op

ECTS Credits:
5 credits/134 hours of work
Language of instruction:
Finnish
Timing:
4th or 5th Autumn. The course is lectured every other year.
Learning outcomes:
After this course the student is familiar with the basics of interpretation of IR, NMR and mass spectra in identification, structure elucidation and quantification of organic molecules.
Contents:
Principles of chromatography, the interpretation of IR, NMR and mass spectra and methods of problem solving with the aid of IR, NMR and mass spectra.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
40 hours of lectures, 20 hours of demonstrations and exercises, 74 hours of work Approximately ¼ of the course is in the scope of quantitative analysis and approximate ¾ qualitative analysis.
Target group:
Chemistry
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:
Williams, D.H. & Fleming, I.: Spectroscopic Methods in Organic Chemistry, 5th ed., McGraw-Hill, Avon, 1995.
Assessment methods and criteria:
Final examination, exercises and tasks during the course
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:
Lecturer Sampo Mattila
Working life cooperation:
No
Other information:
No

781658S: Surface Analytical Techniques, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 credits /134 hours of work
Language of instruction:
Finnish/English on demand
Timing:
4th or 5th spring. The course is lectured every other year, next time autumn 2015.
Learning outcomes:
Upon completion the student should have acquired knowledge and understanding of function of techniques and applications of them.
Contents:
Field emission scanning electron microscope, Energy filtered transmission electron microscope, Computer controlled electron probe microanalyzer and X-ray photoelectron spectroscopy, sample preparation, applications.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
50 hours of lectures, portfolio 10 hours, essay 10 hours, self-study 64 hours
Target group:
Chemistry, optional
Prerequisites and co-requisites:
Inorganic Chemistry I (780353A or 781301A)
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:
Brandon & Kaplan, Microstructural Characterization on Materials, Wiley, 2008
Assessment methods and criteria:
Problem based learning. This course unit utilizes continuous assessment. The students will be compiling a learning diary all through the course unit, and write a essay. Learning diary and essay will be assessed. The assessment of the course unit is based on the learning outcomes of the course unit. Attendance is compulsory. 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:
Lecturer Minna Tiainen
Working life cooperation:
No
Other information:
No

782637S: Surface Chemistry, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 credits /134 hours of work

Language of instruction:
Finnish/English on demand
Timing:
4th or 5th autumn. The course is lectured every other year, next time during the autumn 2017.
Learning outcomes:
Upon completion of the course, the student will be able to explain the essential phenomena of surface chemistry, such as surface tension, interfaces and surface reactions. The student knows the properties of liquid surfaces and interfaces, and the role of surface active agents. The student will be able to explain properties of surfaces and surface phenomena. The student knows the most important surface structures and methods used in surface science studies. Surface phenomena are significant in several industrial applications, and those applications are theoretically studied during the course.
Contents:
Properties of liquid-gas, liquid-liquid, solid-gas and solid-liquid interfaces. Surface structures, Surface phenomena and Surface analytical methods. A wide range of applications are considered on molecular level, such as emulsions, foams, flotation, nucleation, surface active agents.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
5O hours of lectures, 84 hours of self-study
Target group:
Chemistry, optional
Prerequisites and co-requisites:
Physical Chemistry I and Physical Chemistry II
Recommended optional programme components:
Previous courses Surface Chemistry I and Surface Chemistry II
Recommended or required reading:
Adamson, A.W.: Physical Chemistry of Surfaces, 6. painos, John Wiley & Sons, New York, 1997 (partly); Somorjai, G. A.: Introduction to Surface Chemistry and Catalysis, John Wiley & Sons, New York, 1994 (partly). Final examination is based on the lectures.
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:
Prof. Ulla Lassi
Working life cooperation:
No
Other information:
No

781655S: X-Ray Crystallography, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced 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 / English
Timing:
4th or 5th year. Next time in the fall semester 2017.
Learning outcomes:
Upon completing the course, the student is familiar with the basic principles of X-ray crystallography and is able to carry out a simple crystal structure determination.
Contents:

The production and detection of X-rays, basic principles of X-ray crystallography: unit cell, crystal systems, lattices, and space groups, basic concepts of powder diffraction and single-crystal diffraction, determination of crystal structures.

Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
Lectures 32 hours, demonstrations 12 hours, independent work 90 hours including the the determination of a crystal structure, which will be carried out by working in pairs.

Target group:
Chemistry, chemistry teachers

Prerequisites and co-requisites:
Inorganic Chemistry I (780353A or 781301A), Inorganic Chemistry II (780391A, 781302A or 781642S)

Recommended optional programme components:
The course is independent and does not require other, simultaneous studies.

Recommended or required reading:
Massa, W.: Crystal Structure Determination, 2. painos, Springer, Berlin, 2004.
Lecture material.

Assessment methods and criteria:
The course will be assessed by a the report of the crystal structure determination.
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:
Risto Laitinen

Working life cooperation:
No

Other information:
No

050124A: Advanced Practice, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 ECTS

Language of instruction:
Finnish

Timing:
4. year, 1. period

Learning outcomes:
Having completed the study module, the student knows how to

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

Contents:
The study module includes the following:

- elaboration of the student’s own objectives for the practice
- goal-oriented planning, implementation and assessment of lessons based on curricula so that the self-direction of the pupils is also taken into account
- observation and analysis of teaching
- getting to know the three-tier support in basic education
- 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

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

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opettajat: Eetu Pikkarainen

Opintokohteen kielet: Finnish

Leikkaavuudet:

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

ECTS Credits:
5 ECTS
Language of instruction:
Finnish. For ITE students: English

Timing:
1st year
Learning outcomes:
- Summarize and contrast central concepts and approaches of educational philosophy
- Compare international perspectives on ethics
- Apply concepts related to philosophy and ethics to discuss educational tasks and relationships in global contexts
- Describe their current educational philosophy and explain and illustrate their approach to professional ethics

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

Mode of delivery:
Blended teaching
Learning activities and teaching methods:
Lectures 20h, seminars 10h, and independent study 105h
Target group:
ITE, LO, Taika, Tekno, Vaka, Kako, AO, Avoin, AMOK
Prerequisites and co-requisites:
No
Recommended optional programme components:
The course is part of Basic Studies in Education
Recommended or required reading:
- Freire, P. (1998). Pedagogy of Freedom: Ethics, Democracy, and Civic Courage. Oxford: Rowman & Littlefield Publishers.

Noddings, N. (2005). Challenge to care in Schools. 2 nd ed. New York: Teachers' College Press.
Assessment methods and criteria:
Active participation,
Essay
Grading:
Pass/Fail
Person responsible:
Jouni Peltonen, Eetu Pikkarainen
Working life cooperation:
Seminar phase of the course work includes observation task on field.

050123A: Research-Based Subject Didactics, 10 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
10 ECTS
Language of instruction:
Finnish
Timing:
4. year autumn, 1. period
Learning outcomes:
The student knows how to
- describe the starting-points of educational research and explain the basics of qualitative and quantitative research.
- make use of didactic research in his/her own subject and compose a thesis in subject didactics.
- choose a relevant research method for his/her study and analyze the research data.
- assess the significance of research in subject didactics for the teaching of his/her own subject and construct the thinking of an inquiring teacher.
- apply the knowledge acquired in the study related to subject didactics in supervised teaching practice.

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

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

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

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

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

Learning activities and teaching methods:
Lectures 8h, methodological exercises and seminar work, a maximum of 42h, and independent work 195h, including the production of a seminar thesis, preparation to act as opponent to another thesis, and familiarization with the other theses.
In supervised teaching practice, 1 credit equals 27 lessons (45 min each) = 16–17 lessons (75 min each).
- lessons to be given: 2–3 (75 min each)
- lessons to be monitored: 3 (75 min)
- independent work

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

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

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

410087P: Sociocultural Contexts of Education, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opettajat: Vesa Puuronen

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay410087P Sociocultural Contexts of Education (OPEN UNI) 5.0 op

Voidaan suorittaa useasti: Kyllä

ECTS Credits:
5 ECTS
Language of instruction:
Finnish. English for the ITE students.
Timing:
1st year
Learning outcomes:
After completion the student is able

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

Contents:
Contents

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

Mode of delivery:
Face-to-face teaching / blended teaching and learning
Learning activities and teaching methods:
Basic part 3 ECTS: Lectures for all 14 h, independent working 67 h
The basic part is composed of studying pre-given material, expert lectures (possibly by guest lecturers), and learning task. In addition, the adoption of learning outcomes are measured by separate assignment (e.g. examination or essay).

Seminar part 2 ECTS: Contact teaching in small study programme groups 10 h, independent working 44 h
The assignment can be for instance learning portfolio, which combines the contents of basic part and student's own life-world experiences.
Target group:
Students in all study programmes of Faculty of Education
Prerequisites and co-requisites:
No
Recommended optional programme components:
The course is part of the Basic Studies in Education (25 ECTS)
Recommended or required reading:
(in applicable parts; to be negotiated with instructor):

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

Assessment methods and criteria:
Basic part 3 ECTS.
Assessment method: Both learning task and examination or essay based on the learning material and lectures.

Seminar part 2 ECTS.
Assessment method: Learning portfolio in study group working

The assessment criteria are weighted in the following way:

- first learning outcome is highlighted in learning task (Basic part)

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

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

In not approved (Fail) completion of the course, student's study products are unfinished, fragmentary and superficial, matters are presented in disconnected way, or the presentation does not show own thinking nor acquisition to the core themes of the course. Study material is not utilized sufficiently, and references are weakly used.
Grading:
pass/fail
Person responsible:
Vesa Puuronen (Veli-Matti Ulvinen)
Working life cooperation:
The seminar part contains working life cooperation.

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

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 ECTS
Language of instruction:
Finnish
Timing:
4. year, 2. period
Learning outcomes:
Having completed the study module, the student knows how to

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

Contents:
The study module includes
- deepening one's own objectives in teaching practice
- observation and analysis of teaching and modules of teaching
- independent, goal-oriented planning, implementation and assessment of a broad teaching package based on curricula in such 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