

Opasraportti

Chemistry (2013 - 2014)

Degree Programme in Chemistry

The Bachelor's Degree in Chemistry

B.Sc. Degree in chemistry (180 cr) consists of the following studies:

	Credits
General Studies	10
Basic Studies	25
Intermediate Studies	65
Minor Subject Studies, from which	50
- Biochemistry or Biology a minimum 5 cr	
- Physics and Mathematics <i>together</i> a minimum 25 cr	
Optional studies	30
All together a minimum	180 cr

Compulsory courses for B.Sc. Degree

General studies/General Studies in Chemistry 10 cr	Cr	Code	Semester
			1st autumn-1st spring

Orientation Course for New Students (Chemistry today, tutorial, HOPS)	1	780078Y	
Tutor meetings (compulsory)	0		1st autumn-3 rd spring
English 1	2	902002Y	1st autumn
English 2	2	902004Y	2nd spring
Literature of Chemistry and Communication Skills	2	780379A	3rd autumn
Maturity test	0	780381A	3rd spring
Swedish	2	901004Y	1st spring
Seminar for the Degree of B.Sc.	1	780380A	3rd spring

Chemistry 90 cr			
Basic Studies 25 cr	Cr	Code	Semester
Introduction to Analytical Chemistry	4	780111P	2nd autumn
General and Inorganic Chemistry I	6	780114P	1st autumn
General and Inorganic Chemistry II	6	780115P	1st autumn
Introduction to Organic Chemistry	6	780103P	1st autumn-1st spring
Introductory Laboratory Course	3	780122P	1st spring

Intermediate Studies 65 cr	Cr	Code	Semester
Inorganic Chemistry I	6	780353A	2nd spring
Inorganic Chemistry II	4	780391A	2nd spring
Laboratory Course I in Inorganic Chemistry	7	780330A	1st spring+2nd spring

Physical Chemistry I	6	780347A	1st spring
Physical Chemistry II	4	780392A	2nd autumn
Laboratory Course I in Physical Chemistry	5	780331A	2nd autumn
Organic Chemistry I	6	780389A	2nd autumn
Organic Chemistry II	4	780393A	2nd spring
Laboratory Course I in Organic Chemistry	4	780329A	2nd autumn
Instrumental Analysis	4	780328A	3rd autumn
Thesis for the Degree of B.Sc.	6	780300A	3rd autumn-3rd spring
Research Training	9	780301A	3rd autumn-3rd spring

Minor Subject Studies 50 cr	Cr	Code	Semester
<i>Biochemistry or Biology a minimum 5 cr</i>			
Biomolecules or	5	740148P	3rd autumn - 3rd spring*
Cell Biology	5	750121P	1st autumn
* or earlier (1st autumn-1st spring)			
<i>Physics and Mathematics together a minimum 25 cr</i>			
Introduction to Mathematical Deduction	5	802151P	1st autumn

Optional Studies 30 cr

The Master's Degree in Chemistry

The Master's Degree in Chemistry is carried out in one of the following specialization lines:

Specialization line	Major
Inorganic and Physical Chemistry	Inorganic Chemistry <i>or</i> Physical Chemistry
Organic Chemistry	Organic Chemistry <i>or</i> Structural Chemistry
Subject Teacher	The student chooses his/her major from the list above

Studies for M.Sc. Degree (Chemist) (120 cr)

Chemistry 104 cr			
Advanced Studies 104 cr	Cr	Code	Semester
Chemical Legislation in Finland	1	780681S	4th spring
Research Work	10	780601S	4th autumn-4th spring
Research Projec of the orientation line	30	78x607S	5th autumn-5th spring
Master Thesis of the orientation line	20	78x602S	5th autumn-5th spring
Maturity test	0	780699S	5th spring
Seminar	3	780690S	5th spring
Final examination of the orientation line	7	78x600S	5th spring
Optional Advanced Studies of Chemistry	33		

Optional Studies 16 cr
Subject Teacher Specialization
The Bachelors Degree in Chemistry (Subject Teacher)

B.Sc. Degree in subject teacher specialization (180 cr) consists of the following studies:

	Credits
General Studies	10
Basic Studies	25
Intermediate Studies	61-63
The other teaching Subject (Physics, Mathematics or Information technology)	40-50
Pedagogical Studies	30
Optional Studies	14-2
All together a minimum	180 cr

Compulsory courses for B.Sc. Degree

General studies/General Studies in Chemistry 10 cr	Cr	Code	Semester
Orientation Course for New Students (Chemistry today, tutorial, HOPS)	1	780078Y	1st autumn-1st spring
Tutor meetings (compulsory)	0		1st autumn-3 rd spring
English 1	2	902002Y	1st autumn
English 2	2	902004Y	2nd spring

Literature of Chemistry and Communication Skills	2	780379A	3rd autumn
Maturity test	0	780381A	3rd spring
Swedish	2	901004Y	1st spring
Seminar for the Degree of B.Sc.	1	780380A	3rd spring

Chemistry 85 cr			
Basic Studies 25 cr	Cr	Code	Semester
Introduction to Analytical Chemistry	4	780111P	2nd autumn
General and Inorganic Chemistry I	6	780114P	1st autumn
General and Inorganic Chemistry II	6	780115P	1st autumn
Introduction to Organic Chemistry	6	780103P	1st autumn-1st spring
Introductory Laboratory Course	3	780122P	1st spring

Intermediate Studies 61-63 cr	Cr	Code	Semester
Inorganic Chemistry I	6	780353A	2nd spring
Inorganic Chemistry II	4	780391A	2nd spring
Laboratory Course I in Inorganic Chemistry	7	780330A	1st spring+2nd spring
Physical Chemistry I	6	780347A	1st spring
Physical Chemistry II	4	780392A	2nd autumn
Laboratory Course I in Physical Chemistry	5	780331A	2nd autumn
Organic Chemistry I	6	780389A	2nd autumn
Organic Chemistry II	4	780393A	2nd spring

Laboratory Course I in Organic Chemistry	4	780329A	2nd autumn
Demonstrations in Physics and Chemistry*	2	780396A	3rd autumn
Thesis for the Degree of B.Sc.	6	780300A	3rd autumn-3rd spring
Research Training	9	780301A	2nd spring-3rd autumn
*can be included in the B.Sc. or in the M.Sc.			

The other Teaching Subject 40-50 cr
Physics or
Mathematics or
Information technology

Pedagogical Studies 30 cr

Optional Studies 14-2 cr

The Master's Degree in Chemistry (Subject Teacher)

Studies for M.Sc. Degree (120 cr)

Advanced Studies in Chemistry 60 cr	Cr	Code	Semester
Chemical Legislation in Finland	1	780321A	4th spring
Maturity test	0	780699S	5th spring

Master Thesis of the orientation area	20	78x602S	5th autumn-5th spring
Final examination of the orientation area	7	78x600S	5th spring
Optional Advanced Studies of Chemistry	32		4th autumn-5 th spring

The other Teaching Subject 20-10 cr

Physics or

Mathematics or

Information technology

Pedagogical Studies 30 cr

Optional Studies 10-20 cr

Chemistry as a minor subject

Chemistry 25 cr:

Subject teachers

General and Inorganic Chemistry I (780114P), 6 cr

General and Inorganic Chemistry II (780115P), 6 cr

Introduction to Organic Chemistry (780103P), 6 cr

Introductory Laboratory Course (780122P), 3 cr

Introduction to Analytical Chemistry (780111P), 4 cr

Others

General and Inorganic Chemistry I (780114P), 6 cr

General and Inorganic Chemistry II (780115P), 6 cr

Introduction to Organic Chemistry (780103P), 6 cr

Introduction to Analytical Chemistry (780111P), 4 cr

Environmental Chemistry (780373A), 3 cr

Chemistry 60 cr:

Basic Studies in Chemistry 25 cr (Subject Teacher) and compulsory Intermediate Studies:

Inorganic Chemistry I (780353A), 6 cr

Physical Chemistry I (780347A), 6 cr

Organic Chemistry I (780389A), 6 cr

And at least one of the followings:

Laboratory Course I in Inorganic Chemistry (780330A), 7 cr

Laboratory Course I in Physical Chemistry (780331A), 5 cr

Laboratory Course I in Organic Chemistry (780332A), 4 cr

And optional Intermediate Studies in Chemistry

Chemistry 120 cr:

Chemistry 60 cr including the courses Inorganic Chemistry II (780391A), Physical Chemistry II (780392A), and Organic Chemistry II (780393A).

Advanced Studies in Chemistry 60 cr

Tutkintorakenteet

B.Sc. Degree in Chemistry (Chemist)

Tutkintorakenteen tila: archived

Lukuvuosi: 2013-14

Lukuvuoden alkamispäivämäärä: 01.08.2013

General Studies (vähintään 7 op)

Compulsory Studies

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

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

780078Y: Orientation Course for New Students, 1 op

901004Y: Swedish, 2 - 3 op

Optional courses

780079Y: Tutoring, 1 op

Major Studies in Chemistry (vähintään 93 op)

Basic Studies in Chemistry

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

be

- 780114P: General and Inorganic Chemistry I, 6 op
- 780115P: General and Inorganic Chemistry II, 6 op
- 780103P: Introduction to Organic Chemistry, 6 op
- 780111P: Introduction to Analytical Chemistry, 4 op
- 780122P: Introductory Laboratory Course in Chemistry, 3 op

Intermediate Studies in Chemistry

A325202: Chemistry, Intermediate Studies, 63 - 105 op

ad

- 780353A: Inorganic Chemistry I, 6 op
- 780391A: Inorganic Chemistry II, 4 op
- 780330A: Laboratory Course I in Inorganic Chemistry, 7 op
- Compulsory*
 - 780330A-01: Laboratory Course I in Inorganic Chemistry (1. part), 2 op
 - 780330A-02: Laboratory Course I in Inorganic Chemistry (2. part), 5 op
- 780347A: Physical Chemistry I, 6 op
- 780392A: Physical Chemistry II, 4 op
- 780331A: Laboratory Course I in Physical Chemistry, 5 op
- 780389A: Organic Chemistry I, 6 op
- 780393A: Organic Chemistry II, 4 op
- 780329A: Laboratory Course I in Organic Chemistry, 4 op
- 780328A: Instrumental Analysis, 4 - 5 op
- 780379A: Literature of Chemistry and Communication Skills, 2 op
- 780301A: Research Training, 9 op
- Compulsory*
 - 780301A-01: Research Training, 3 op
 - 780301A-02: Research Training, 3 op
 - 780301A-03: Research Training, 3 op
- 780300A: Thesis for the Degree of B.Sc., 6 op
- 780380A: Seminar for the Degree of B.Sc., 1 op
- 780381A: Maturity test, 0 op

Electives

- 780344A: Industrial Training IV, 8 op
- 780372A: Basic Principles of Green Chemistry, 4 op
- 780373A: Environmental Chemistry, 3 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).

Biochemistry or Biology (minimum 5 credits)

Mathematics (minimum 5 credits)

802151P: Introduction to mathematical deduction, 5 op

Basic Studies in Physics (761110P) 25 credits

Basic and Intermediate Studies of Physics (60 credits entity)

Process Engineering (optional)

- 477012P: Introduction to Automation Engineering, 5 op
 488011P: Introduction to Environmental Engineering, 5 op
 477011P: Introduction to Process and Environmental Engineering I, 5 op

Geology (optional)

- 771102P: Basic course in mineralogy, 6 op
 771101P: Endogenic processes, 4 op
 771109P: Exogenic Processes, 3 op
 772103P: Field course in bedrock geology, 3 op
 771108P: Introduction to Ore Geology, 2 op
 771106P: Introduction to bedrock geology of Finland, 2 op
 771107P: Introduction to historical geology and surficial geology of Finland, 2 op
 771104P: Quaternary geology, 5,5 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 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.

B.Sc. Degree in Chemistry (Teacher training)

Tutkintorakenteen tila: archived

Lukuvuosi: 2013-14

Lukuvuoden alkamispäivämäärä: 01.08.2013

General Studies (vähintään 7 op)

Compulsory Studies

- 902002Y: English 1 (Reading for Academic Purposes), 2 op
 902004Y: English 2 (Scientific Communication), 2 op
 780078Y: Orientation Course for New Students, 1 op
 901004Y: Swedish, 2 - 3 op

Optional courses

- 780079Y: Tutoring, 1 op

Major Studies in Chemistry (vähintään 89 op)

Basic Studies in Chemistry

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

be

- 780114P: General and Inorganic Chemistry I, 6 op
- 780115P: General and Inorganic Chemistry II, 6 op
- 780103P: Introduction to Organic Chemistry, 6 op
- 780111P: Introduction to Analytical Chemistry, 4 op
- 780122P: Introductory Laboratory Course in Chemistry, 3 op

Intermediate Studies in Chemistry (64-66 credits)

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

Compulsory

- 780353A: Inorganic Chemistry I, 6 op
- 780391A: Inorganic Chemistry II, 4 op
- 780330A: Laboratory Course I in Inorganic Chemistry, 7 op

Compulsory

- 780330A-01: Laboratory Course I in Inorganic Chemistry (1. part), 2 op
- 780330A-02: Laboratory Course I in Inorganic Chemistry (2. part), 5 op
- 780347A: Physical Chemistry I, 6 op
- 780392A: Physical Chemistry II, 4 op
- 780331A: Laboratory Course I in Physical Chemistry, 5 op
- 780389A: Organic Chemistry I, 6 op
- 780393A: Organic Chemistry II, 4 op
- 780329A: Laboratory Course I in Organic Chemistry, 4 op
- 780379A: Literature of Chemistry and Communication Skills, 2 op
- 780396A: Demonstrations in Physics and Chemistry, 2 op
- 780301A: Research Training, 9 op

Compulsory

- 780301A-01: Research Training, 3 op
- 780301A-02: Research Training, 3 op
- 780301A-03: Research Training, 3 op
- 780300A: Thesis for the Degree of B.Sc., 6 op
- 780380A: Seminar for the Degree of B.Sc., 1 op
- 780381A: Maturity test, 0 op

Electives

- 780395A: Chemistry for Teachers, 4 op
- 780372A: Basic Principles of Green Chemistry, 4 op
- 780344A: Industrial Training IV, 8 op
- 780373A: Environmental Chemistry, 3 op

Subsidiary Entity for Subject Teacher (40-50 credits) (vähintään 40 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

Physics

Information Processing Science

Pedagogical Studies (30 credits) (vähintään 30 op)

- 410067P: Basic course in education, 4 op
- 050081A: Basic teaching practice, 5 op
- 410068P: Didactics, 4 op

410069P: Educational psychology, 4 op
 050091A: Optional studies, 3 op
 410083P: Pedagogical seminar, 3 op
 050114A: Subject didactics I/Mathematics and natural sciences, 3 op
 050214A: Subject didactics II/Mathematics and natural sciences, 3 op
 050314A: Subject didactics III/Mathematics and natural sciences, 1 op

Optional Studies (14-2 credits) (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: 2013-14

Lukuvuoden alkamispäivämäärä: 01.08.2013

Major Studies in Chemistry (vähintään 60 op)

Advanced Studies for All (compulsory)

780681S: Chemical Legislation in Finland, 1 op

780699S: Maturity Test, 0 op

Major in Inorganic Chemistry (teacher training) (compulsory)

781600S: Final Examination in Inorganic Chemistry, 7 op

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

Major Physical Chemistry (teacher training) (compulsory)

782600S: Final Examination in Physical Chemistry, 7 op

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

Major Organic Chemistry (teacher training) (compulsory)

783600S: Final Examination in Organic Chemistry, 7 op

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

Major in Structural Chemistry (teacher training) (compulsory)

784600S: Final Examination in Structural Chemistry, 7 op

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

Optional Advanced Studies in Chemistry (compulsory)

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) (vähintään 30 op)

050082A: Advanced teaching practice I, 6 op
 050083A: Advanced teaching practice II, 6 op
 416004A: Basics of educational administration, 2 op
 410071P: Educational philosophy, 4 op
 050410A: Research in subject didactics, 8 op
 410070P: Sociology of education, 4 op
 050085A: Special education, 1 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 optional 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

M.Sc. Degree in Chemistry (Chemist)

Tutkintorakenteen tila: archived

Lukuvuosi: 2013-14

Lukuvuoden alkamispäivämäärä: 01.08.2013

Major Studies in Chemistry (vähintään 104 op)

Advanced Studies in Chemistry for All (compulsory)

780681S: Chemical Legislation in Finland, 1 op
 780699S: Maturity Test, 0 op
 780601S: Project work, 12 op
 780690S: Seminar, 3 op

Major Inorganic Chemistry

781600S: Final Examination in Inorganic Chemistry, 7 op
 781602S: Master's Thesis in Inorganic Chemistry, 20 op
 781607S: Research Project in Inorganic Chemistry, 30 op

Major Physical Chemistry

782600S: Final Examination in Physical Chemistry, 7 op
 782602S: Master's Thesis in Physical Chemistry, 20 op
 782607S: Research Project in Physical Chemistry, 30 op

Major Organic Chemistry

783600S: Final Examination in Organic Chemistry, 7 op
 783602S: Master's Thesis in Organic Chemistry, 20 op
 783607S: Research Project in Organic Chemistry, 30 op

Major Structural Chemistry

784600S: Final Examination in Structural Chemistry, 7 op
 784602S: Master's Thesis in Structural Chemistry, 20 op
 784607S: Research Project in Structural Chemistry, 30 op

Optional Advanced Courses in Chemistry (minimum 33 credits)

Optional Studies (vähintään 16 op)

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

Tutkintorakenteisiin kuulumattomat opintokokonaisuudet ja -jaksot

300003Y: Activities in university and student organizations, 1 - 4 op
 783633S: Adhesion Chemistry, 3 op
 300002M: Advanced Information Skills, 1 op
 781625S: Aquatic Chemistry, 4 op
 781637S: Atomic Spectrometric Methods, 4 op
 780109P: Basic Principles in Chemistry, 4 op
 784637S: Biological NMR Spectroscopy, 3 op
 782621S: Catalysis, 3 op
 782627S: Chemical Applications in Hazardous Waste Management and Environmental Technology, 4 op
 780321A: Chemical Legislation in Finland, 1 op
 782634S: Chemistry in industrial applications, 3 op
 782636S: Chemistry of Hydrometallurgical processes, 3 op
 781610S: Chemistry of Metal Complexes, 3 op
 783627S: Chemistry of Natural Substances I, 3 op
 783641S: Chemistry of Natural Substances II, 3 op
 781621S: Chemistry of Non-Metals, 3 op
 783635S: Chemistry of Paints and Surface Coatings, 3 op
 781613S: Chemistry of Rare Earth Elements, 3 op
 781645S: Chemistry of Solid Fuels Ashes, 3 op
 781644S: Computational Inorganic Chemistry, 3 op
 784626S: Computer Analysis of NMR Spectra, 2 op
 781632S: Determination of Trace Elements, 3 op
 782635S: Electrochemistry, 3 op
 781633S: Experimental Design, 4 op
 782618S: High Pressure Kinetics, 3 op
 781638S: ICP-MS Workshop, 3 op
 780341A: Industrial Training I, 2 op
 780342A: Industrial Training II, 4 op
 780343A: Industrial Training III, 6 op
 781642S: Inorganic Chemistry II, 4 op
 782629S: Interactions between Molecules, 4 op
 783650S: Introduction to Chemistry, 2 op
 783638S: Introduction to Fiber Chemistry of Polysaccharides, 3 op
 780112P: Introduction to Organic Chemistry, 4 op

780326A: Introduction to Polymer Chemistry, 2 op
 780332A: Laboratory Course I in Organic Chemistry, 4 op
 781641S: Laboratory Course in Synthetic Inorganic Chemistry, 4 op
 783605S: Literature Survey in Organic Chemistry, 9 op
 781627S: Main Group Chemistry, 5 op
 781601S: Master's Thesis in Inorganic Chemistry, 38 op
 783601S: Master's Thesis in Organic Chemistry, 38 op
 782601S: Master's Thesis in Physical Chemistry, 38 op
 784601S: Master's Thesis in Structural Chemistry, 38 op
 781639S: Molecular Symmetry and Spectroscopy, 5 op
 784617S: Multinuclear NMR Spectroscopy in Structure Elucidation, 4 op
 784610S: NMR Spectroscopy in Organic Chemistry, 3 op
 784623S: NMR Workshop I, 4 op
 784624S: NMR Workshop II, 4 op
 784638S: NMR Workshop III, 4 op
 784639S: NMR Workshop IV, 4 op
 783643S: Organic Chemistry II, 4 op
 783639S: Organic Chemistry III, 5 op
 783614S: Organic Chemistry of Drug Compounds, 3 op
 783640S: Organometallic Chemistry, 3 op
 783645S: Pericyclic chemistry, 3 op
 782631S: Physical Chemistry II, 4 op
 783620S: Polymer Chemistry, 3 op
 783636S: Polymer Chemistry in Materials Sciences, 3 - 4 op
 783634S: Research Seminar in Organic Chemistry, 2 op
 782623S: Research Seminar in Physical Chemistry, 2 op
 781640S: Sampling and Sample Preparation, 4 op
 781647S: Scanning electron microscopy, 3 op
 788602S: Seminar in Structural Chemistry, 2 op
 781611S: Solid State Chemistry, 4 op
 781631S: Statistical Methods in Analytical Chemistry, 4 op
 784640S: Structural Chemistry I, 5 op
 780317A: Structural Chemistry I, 5 op
 781614S: Structural Methods in Inorganic Chemistry, 3 op
 782620S: Surface Chemistry I, 3 op
 782633S: Surface chemistry II, 3 op
 781630S: Symposium in inorganic and analytical chemistry, 2 op
 783642S: Synthetic Methods in Green Chemistry, 4 op
 783619S: Wood Chemistry, 3 op
 781646S: X-Ray Crystallography, 6 op

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: Language Centre

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Proficiency level:

B2/C1 on the [Common European Framework of Reference](#) scale.

Status:

In the Faculty of Science, this course is mandatory for all degree programmes except Geography. Please consult the Faculty Study Guide to establish the language requirements for your own degree programme.

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 credits (total work load 54 hours including classroom meetings.)

Language of instruction:

English

Timing:

Biology: 1st year spring term

Chemistry: 1st year autumn term

Geology: 1st year spring term

Information Processing Science: 1st year spring term

Mathematical Sciences: 1st year spring term

Physical Sciences: 1st year autumn term

Learning outcomes:

By the end of the course, you are expected

- to have acquired effective vocabulary learning techniques by being able to distinguish parts of words to infer meanings
- to understand and be able to construct basic grammatical structures used in formal written English
- to be able to utilize text structure and cohesion markers when reading academic texts
- to be able to apply effective reading techniques and have necessary skills to extract global and detailed information with considerable ease and speed from general texts related to Natural Sciences as well as texts /textbooks of their own field

Contents:

In this course, students improve their understanding of written academic English used in texts in Natural Sciences as well as expand their general and scientific vocabulary. Students become aware of their own role in learning and use a variety of different study methods in order to develop their own language learning strategies, which will enhance their academic English.

Mode of delivery:

Contact teaching

Learning activities and teaching methods:

Contact teaching (26 hours) and self-study 28 hours

Target group:

1st year students of Biology, Chemistry, Geology, Information Processing Science, Physics, and Mathematics

Prerequisites and co-requisites:

-

Recommended optional programme components:

In addition to this course, students are required to take 902004Y Scientific Communication.

Recommended or required reading:

Set books for substance studies; journal articles in print and on-line.

Assessment methods and criteria:

Continuous assessment takes into account active and regular participation in classroom sessions and successful completion of all homework tasks, vocabulary quizzes, and an end of course exam.

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

Grading:

Pass/Fail

Person responsible:

Biology, Geology, Information Processing: Karen Niskanen

Chemistry, Physics, Mathematics: Patrick Nesbitt

Working life cooperation:

-

Other information:

N.B. Students with grades *laudatur* or *eximia* in their A1 English school-leaving examination can be exempted from this course and will be granted the credits by the Faculty of Science.

Retake examinations: Two retake examinations are allowed on the dates set by the Extension School. See the dates and registration instructions at: <http://www oulu.fi/kielikoulutus>

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

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Language Centre

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 CEFR scales

Status:

This course is mandatory for all 2nd year students (except **geographers**) who will have English as their foreign language in their B.Sc. degree. This includes the students who were exempted from 'Reading for Academic Purposes'(902002Y). Please consult the faculty study guide to establish the language requirements on your own degree programme.

Required proficiency level:

Students taking this course must have had English as the A1 or A2 language at school or the equivalent English skills should have been acquired otherwise. The course 'Reading for Academic Purposes' (902002Y) is a pre-requisite, unless exempted.

ECTS Credits:

The student workload is 53 hrs work/ 2 ECTS credits.

Language of instruction:

English

Timing:

Biology: 2nd year autumn term

Chemistry: 2nd year spring term

Geology: 2nd year spring term

Information Processing Science : 2nd year autumn term

Mathematics: 2nd year spring term

Physics: 2nd year autumn term

Learning outcomes:

By the end of the course, you are expected:

1. to have provided evidence of oral fluency in pair work communication and small group discussions.
2. to have developed effective language learning strategies through autonomous homework.
3. to have demonstrated the ability to prepare and present scientific subjects, using appropriate field-related vocabulary.
4. to have demonstrated lecture listening skills in field-related situations.

Contents:

Skills in listening, speaking, and giving presentations are practised in the course. Homework tasks include autonomous work to support the classroom learning and the task of preparing and presenting a scientific presentation.

Mode of delivery:

Contact teaching

Learning activities and teaching methods:

Contact teaching 28 hours, homework 28 hours

Target group:

2nd year students of Biology, Chemistry, Geology, Information Processing Science, Mathematics, Physics

Prerequisites and co-requisites:

-

Recommended optional programme components:

Also required: [902002Y Reading for Academic Purposes Englannin kieli 1](#)

Recommended or required reading:

Course materials will be provided by the teacher and a copy fee will be charged.

Assessment methods and criteria:

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

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

Grading:

Pass / fail.

Person responsible:

Jolene Gear

Working life cooperation:

Other information:

Alternative method of course completion: An optional exemption test is offered twice per year. The student can only participate in the exemption exam once. See [exemption exam details and schedule](#).

780078Y: Orientation Course for New Students, 1 op

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Kopsa-Moilanen, Vieno Maria

Opintokohteen kielet: Finnish

ECTS Credits:

1 credits/27 hours of work

Language of instruction:

Finnish

Timing:

1st autumn and 1st 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 department of chemistry, Orientation in small groups, and PSP (Personal Study Plan).

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

The autumn term: The programme of the orientation week and the tours in the Department of Chemistry, Orientation in small groups: 10-15 hours of visits and discussions with the group tutor. Making of PSP (Personal Study Plan) (in weboodi) is started; The spring term: the planning of PSP is completed.

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 Department of Chemistry, 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:

Professor Marja Lajunen, Lecturer L. Kaila, Amanuensis, and Small group tutors.

Working life cooperation:

No

Other information:

The course is completed when all the four parts are passed.

901004Y: Swedish, 2 - 3 op

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Language Centre

Opintokohteen kielet: Swedish

Leikkaavuudet:

- 901035Y Second Official Language (Swedish), Oral Skills 1.0 op
- 901034Y Second Official Language (Swedish), Written Skills 1.0 op
- ay901004Y Swedish (OPEN UNI) 2.0 op

Proficiency level:

B1/B2/C1 (CEFR scale)

Status:

This course is compulsory to all students except those who have at least 60 ECTS credits of Swedish studies in their degrees. The language proficiency provided by the course unit is equivalent to the language proficiency required of a state official with an academic degree working in a bilingual municipality area (Act 424/03 and Decree 481/03).

Required proficiency level:

The required starting proficiency level for students of all faculties is a grade of 7 or higher from the Swedish studies at secondary school (B-syllabus) or matriculation examination grade A - L or a passing grade from the Brush up course in Swedish 901018Y.

If a student doesn't meet these requirements or his/her language skills are otherwise lacking, he/she must achieve the required proficiency level BEFORE taking this compulsory Swedish course

ECTS Credits:

2 ECTS credits (Biochemistry 3 ECTS credits)

Language of instruction:

Swedish

Timing:

See the study guide of the Faculty of Science.

Learning outcomes:

Upon completion of the course the student should have acquired the necessary proficiency level in Swedish to be able to manage in the most common communication situations related to his/her professional work tasks. He/she should be able to use basic grammatical structures fairly well in both speech and writing. He/she should be able to use the most common situational phrases understandably in various communication situations. He/she should be able to find the main points in general academic texts and texts related to his/her field of study and relay this information to colleagues or an audience of laymen using Swedish. He/she should be able to write short texts relating to his/her field of study.

Contents:

Communicative oral and written exercises, which aim to develop the student's Swedish proficiency in areas relevant to his/her academic field and future professional tasks. The student practises oral presentation and pronunciation. Situational oral exercises done individually and in pairs and groups. Discussions in small groups. Current texts about the student's special field. Listening comprehension exercises. Written exercises relating to the student's professional field.

Mode of delivery:

Contact teaching

Learning activities and teaching methods:

2 ECTS credits: 28 hours of contact teaching (1 x 180 minutes per week) and related exercises, self-directed study. The course unit's total workload is 53 hours.

3 ECTS credits (biochemistry): 45 hours of contact teaching (2 x 90 minutes per week) and related exercises, 35 hours of self-directed study. The course unit's total workload is 80 hours.

Target group:

Students of the Faculty of Science

Prerequisites and co-requisites:

See Required Proficiency Level

Recommended optional programme components:

-

Recommended or required reading:

The material, which is special field-specific, authentic and up to date, is distributed during the course. Students must pay for their course material.

Assessment methods and criteria:

The course focuses on improving both oral and written language skills and requires active attendance and participation in exercises, which also require preparation time. 100% attendance is required. The course unit tests

both oral and written language skills. Students participate in the teaching in either autumn semester or spring semester.

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

Grading:

Assessment is based on continuous assessment and exams. Approved completion of the course unit requires that the student achieves at least satisfactory oral and written language skills. The grades are based on continuous assessment and the course exams. Oral and written language skills are graded separately. The possible grades are satisfactory skills (CERF proficiency level B1) and good skills (CERF proficiency levels B2-C1). For more information on the proficiency levels of oral and written language skills, see Assessment Criteria (in Finnish).

Person responsible:

Lecturer Rauno Varonen

Working life cooperation:

-

Other information:

Teaching will begin according to the schedule

780079Y: Tutoring, 1 op

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Kopsa-Moilanen, Vieno Maria

Opintokohteen kielet: Finnish

ECTS Credits:

1 credits/ 27 hours of work

Language of instruction:

Finnish

Timing:

2nd autumn or 3rd 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:** Department of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**Voidaan suorittaa useasti:** Kyllä

Ei opintojaksokuvauksia.

*be***780114P: General and Inorganic Chemistry I, 6 op****Voimassaolo:** 01.08.2012 -**Opiskelumuoto:** Basic Studies**Laji:** Course**Vastuuyksikkö:** Department of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Leena Kaila**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

ay780117P	General and Inorganic Chemistry A (OPEN UNI)	5.0 op
ay780118P	General and Inorganic Chemistry B (OPEN UNI)	5.0 op
780113P	Introduction to Chemistry	12.0 op
780109P	Basic Principles in Chemistry	4.0 op
780101P	Introduction to Physical Chemistry	7.0 op
780102P	Introduction to Inorganic Chemistry	5.0 op
780109P	Basic Principles in Chemistry	4.0 op

ECTS Credits:

6 credits/160 hours of work

Language of instruction:

Finnish

Timing:

1 st Autumn

Learning outcomes:

After this course the student should 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, thermodynamics, electrons in atoms, periodic table, chemical bond.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

40 hours of lectures and applications, 24 hours of exercises and 96 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:

This course is a part of the earlier lectured course 780113P Introduction to Chemistry (12 credits).

Recommended or required reading:

Petrucci, R.H., Herring, F.G., Madura, J.D. ja Bissonnette, C.: General Chemistry: Principles and Modern Applications, 10. painos (myös 7., 8. ja 9. painos), Pearson Canada Inc., Toronto, 2011. Chapters 1-11, 12.5-7, 13.2, 19.1-5.

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:

Lecturer Leena Kaila

Working life cooperation:

No

Other information:

No

780115P: General and Inorganic Chemistry II, 6 op

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Leena Kaila

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay780117P	General and Inorganic Chemistry A (OPEN UNI)	5.0 op
ay780118P	General and Inorganic Chemistry B (OPEN UNI)	5.0 op
780113P	Introduction to Chemistry	12.0 op
780101P	Introduction to Physical Chemistry	7.0 op
780102P	Introduction to Inorganic Chemistry	5.0 op
780109P	Basic Principles in Chemistry	4.0 op

ECTS Credits:

6 credits/160 hours of work

Language of instruction:

Finnish

Timing:

1 st Autumn

Learning outcomes:

After this course the student should understand basic concepts of chemistry as described in international general chemistry curriculum.

Contents:

Intermolecular forces, phase equilibrium, reaction kinetics, chemical equilibrium, acid-base equilibrium, equilibrium in water solutions of slightly soluble salts, electrochemistry.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

40 hours of lectures and applications, 26 hours of exercises, 94 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:

This course is a part of the earlier lectured course 780113P Introduction to Chemistry.

Recommended or required reading:

Petrucci, R.H., Herring, F.G., Madura, J.D. ja Bissonnette, C.: General Chemistry: Principles and Modern Applications, 10. painos (myös 7., 8. ja 9. painos), Pearson Canada Inc., Toronto, 2011. Chapters 12.1-4, 13-18, 19.6-8, 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:

Lecturer Leena Kaila

Working life cooperation:

No

Other information:

No

780103P: Introduction to Organic Chemistry, 6 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Johanna Kärkkäinen, Marja Lajunen

Opintokohteen kielet: Finnish

Leikkaavuudet:

780112P	Introduction to Organic Chemistry	4.0 op
780103P2	Organic Chemistry I	6.0 op
780108P	Basic Course in Organic Chemistry	6.0 op

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

6 credits/160 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 explain organic chemistry fundamentals, basic concepts and terminology, can use them for description of organic chemistry phenomena. He/she can name organic structures, explain their properties, deduce basic reaction types and solve their mechanisms.

Contents:

Basic reactions of organic compounds, basic principles of stereochemistry and reaction mechanisms: Addition, elimination, substitution, including electrophilic aromatic substitution, reactions of carbonyl group. Applications.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

52 hours of lectures and applications plus 6 hours of exercises, 102 hours of independent self-study

Target group:

Biochemistry, Chemistry, compulsory. In the study entity of 25 credits compulsory. Physical Sciences, 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, 10th 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:

Three 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. Marja Lajunen and Ph.D. Johanna Kärkkäinen

Working life cooperation:

No

Other information:

No

780111P: Introduction to Analytical Chemistry, 4 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Paavo Perämäki

Opintokohteen kielet: Finnish

Leikkaavuudet:

780110P Analytical Chemistry I 5.5 op

ECTS Credits:

4 credits /107 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 + 10 hours of exercises + 67 hours of self-study

Target group:

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

Prerequisites and co-requisites:

General and Inorganic Chemistry I and II (780114P and 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.: Analyttisen kemian perusteet, Oulun yliopistopaino, 2004.

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

780122P: Introductory Laboratory Course in Chemistry, 3 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits/80 hours of work

Language of instruction:

Finnish

Timing:

1st autumn or 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 tools and can use them properly. He/she can perform basic inorganic determinations: acid-base titrations, mass analysis or spectroscopic measurements and can apply them to

analyze inorganic synthetic products, or use study thin layer chromatography to study purity of organic products. The student can write a report related to the performance and analysis of the synthesis.

Contents:

Laboratory safety, Bunsen burner, balances, volumetric measures, gravimetric determination, acid-base titration, pH, titration curves, acid-base indicators, buffer solutions, synthesis and analysis of an inorganic product, spectrophotometric determination, an organic synthesis, TLC. Written report.

Mode of delivery:

Supervised laboratory work

Learning activities and teaching methods:

Safety in laboratory 2 hours, 40 hours of laboratory work + demonstrations, 38 hours of self study

Target group:

Biochemistry, Biology, Chemistry, Process Engineering, Environmental engineering, compulsory. In the entity of 25 credits, compulsory. Physical Sciences, Geology, Mathematical Sciences, optional.

Prerequisites and co-requisites:

Basic Principles in Chemistry (780109P) or Introduction to Chemistry (780113P) passed, or participation in the courses General and Inorganic Chemistry I (780114P) and General and Inorganic Chemistry II (780115P).

Recommended optional programme components:

The course Basic Principles in Chemistry (780109P) or Introduction to Chemistry (780113P) passed, or Biochemistry, Chemistry and teacher education students of Mathematics and Physics: simultaneous participation in the courses General and Inorganic Chemistry I (780114P) and General and Inorganic Chemistry II (780115P).

Recommended or required reading:

Instruction Book (in Finnish): Kemian perustyöt

Assessment methods and criteria:

Final examination. Laboratory works 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:

Prof. Marja Lajunen and teaching assistants

Working life cooperation:

No

Other information:

Attendance at the lecture of Safety at work is compulsory. 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: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

ad

780353A: Inorganic Chemistry I, 6 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

780356A Inorganic Chemistry 9.0 op

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

6 credits/160 hours of work

Language of instruction:

Finnish

Timing:

2nd spring

Learning outcomes:

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

Contents:

Atomic structure, chemical bond and molecular structure, molecular symmetry, solid state chemistry, acid-base theories, oxidation-reduction reactions, overview of main group chemistry.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

40 hours of lectures, 16 hours of exercises, self-study (including 8 home assignments) 104 hours

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

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:

Atkins, P., Overton, T., Rourke, J., Weller, M., and Armstrong, F., Inorganic Chemistry, 5th ed., Oxford University Press, 2009. Chapters 1-6, 8.

Assessment methods and criteria:

The assessment of the course is based on the final examination and home assignments

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. Risto Laitinen

Working life cooperation:

No

Other information:

No additional information

780391A: Inorganic Chemistry II, 4 op

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

781642S Inorganic Chemistry II 4.0 op

780356A Inorganic Chemistry 9.0 op

ECTS Credits:

4 credits / 107 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 and bonding 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:

22 hours of lecture, 16 hours of exercises, self-study (including 8 home assignments) 69 hours

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

Inorganic Chemistry I (780353A) 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:

Atkins, P., Overton, T., Rourke, J., Weller, M. ja Armstrong, F.: Inorganic Chemistry, 5. painos, Oxford University Press, Oxford 2009. Chapters 7, 19-23, 26-27.

Assessment methods and criteria:

The assessment of the course is based on the final examination and home assignments. 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:

Doc. Raija Oilunkaniemi

Working life cooperation:

No

Other information:

The content and credits of this course are the same as in the course 781642S Inorganic Chemistry II. The student can perform this course only once: 780391A Inorganic Chemistry II or 781642S Inorganic Chemistry II.

780330A: Laboratory Course I in Inorganic Chemistry, 7 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Leena Kaila

Opintokohteen kielet: Finnish

ECTS Credits:

7credits /187 hours of work

Language of instruction:

Finnish

Timing:

Part 1 (780330A-01): 1st spring

Part 2 (780330A-02): 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 and basic inorganic synthetic chemistry.

Contents:

Part 1: Introduction to inorganic ion reactions and a qualitative analysis

Part 2: Water analysis, neutralization, synthesis and characterization of two complex compounds

Mode of delivery:

Face-to-face teaching, compulsory

Learning activities and teaching methods:

Part 1: 45 hours of laboratory work, 10 hours of work reports + final examination

Part 2: 80 hours of laboratory work, 44 hours of work reports + final examination, 8 hours of self-study.

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

Part 1.: General and Inorganic Chemistry I and II (780114P and 780115P) or Introduction to Chemistry (780113P) or Introduction to Physical Chemistry (780101P9 and Introduction to Inorganic Chemistry (780102P). Introductory Laboratory Course in Chemistry (780122P).

Part 2.: General and Inorganic Chemistry I and II (780114P and 780115P) or Introduction to Chemistry (780113P) or Introduction to Physical Chemistry (780101P) and Introduction to Inorganic Chemistry (780102P), Introduction to Organic Chemistry (780103P or 780112P). Introductory Laboratory Course in Chemistry (780122P) and the first part of this laboratory course completed.

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:

Lecturer Leena Kaila, Lecturer Minna Tiainen and teaching assistants

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.

780330A-01: Laboratory Course I in Inorganic Chemistry (1. part), 2 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Minna Tiainen

Opintokohteen kielet: Finnish

ECTS Credits:

2 credits/ 53 hours of work

Language of instruction:

Finnish

Timing:

1st Spring

Learning outcomes:

At the end of the course, the students should have acquired an understanding of basic qualitative inorganic chemistry.

Contents:

Introduction to inorganic ion reactions and a qualitative analysis

Mode of delivery:

Face-to-face teaching, compulsory

Learning activities and teaching methods:

45 hours of laboratory work, 10 hours of work reports

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

General and Inorganic Chemistry I and II (780114P and 780115P) or Introduction to Chemistry (780113p) or Introduction to Physical Chemistry (780101P9 and Introduction to Inorganic Chemistry (780102P). Introductory Laboratory Course in Chemistry (780122P).

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.

Person responsible:

Lecturer M. Tiainen

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.

780330A-02: Laboratory Course I in Inorganic Chemistry (2. part), 5 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Leena Kaila

Opintokohteen kielet: Finnish

ECTS Credits:

5 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 classical quantitative inorganic chemistry and basic inorganic synthetic chemistry.

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, 44 hours of work reports + final examination, 8 hours of self-study.

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

General and Inorganic Chemistry I and II (780114P and 780115P) or Introduction to Chemistry (780113P) or Introduction to Physical Chemistry (780101P) and Introduction to Inorganic Chemistry (780102P), Introduction to Organic Chemistry (780103P or 780112P). Introductory Laboratory Course in Chemistry (780122P) and the first part of this laboratory course completed.

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. The works are 75% and the final examination 25 %.

Person responsible:

Lecturer Leena Kaila

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.

780347A: Physical Chemistry I, 6 op**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Department of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Pursiainen Jouni**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

780318A Physical Chemistry II 6.5 op

ECTS Credits:

6 credits/160 hours of work

Language of instruction:

Finnish

Timing:

1 st 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. Chemical kinetics shows how the systems can reach equilibrium.

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, 90 hours of self-study

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

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, 22-23, or 9. edition or newest. Examination is based in the text book.

Assessment methods and criteria:

Weekly 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

780392A: Physical Chemistry II, 4 op**Voimassaolo:** 01.08.2012 -**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Department of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

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

ECTS Credits:

4 credits / 107 hours of work

Language of instruction:

Finnish. English on demand.

Timing:

2nd Autumn

Learning outcomes:

After completing this course the students should have good knowledge of the basics of quantum mechanics and statistical mechanics and their role in physical chemistry.

Contents:

Basic of quantum mechanics, particle-in-box, hydrogen atoms, LCAO model for molecules. Basics of statistical mechanics, partition function and how to derive statistical properties from it. Ideal and real gases. Diffusion and electrical conductivity.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

36 hours of lecture, 8 hours of exercises, 62 hours of self-study

Target group:

Chemistry

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:

P.W. Atkins and J. de Paula, Atkins' Physical Chemistry, 8th ed., 2006 (or 7th ed., 2002), Oxford University Press, Chapters 8-11, 16-17, 21; or 9. ed. or newest ed.

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:

The contents and the credits of the course are the same as in the course 782631S Physical Chemistry II. The student can perform only one of them.

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

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Sanna Komulainen

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

780389A: Organic Chemistry I, 6 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Hormi Osmo

Opintokohteen kielet: Finnish

Leikkaavuudet:

780385A Organic Chemistry I 9.0 op

ECTS Credits:

6 credits/160 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, basics in physical organic chemistry especially the Hammett plot, details in nucleophilic substitution, conformation and stereochemistry in organic compounds.

Contents:

Molecular orbitals in organic compounds, conformation theory, Hammett plot, nucleophilic substitution and stereochemistry.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

50 hours of lectures, 110 hours self study

Target group:

Chemistry, compulsory. In the entity of 60 credits, compulsory.

Prerequisites and co-requisites:

Introduction to Organic Chemistry (780103P) and 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. and Wothers, P.: Organic Chemistry, Oxford University Press, 2001. Chapters 1-4, 7, 16-18, 34 ja 42 and pages 1090-1100.

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. Osmo Hormi

Working life cooperation:

No

Other information:

No

780393A: Organic Chemistry II, 4 op

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Marja Lajunen

Opintokohteen kielet: Finnish

Leikkaavuudet:

780386A Organic Chemistry II 9.0 op

783643S Organic Chemistry II 4.0 op

ECTS Credits:

4 credits/ 107 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 polar additions and eliminations, as well as reactions of carbonyl compounds as nucleophilic reagents. The student can compare and judge properties and reactions of aromatic heterocyclics and apply these to a practical synthetic route design.

Contents:

Polar additions and eliminations, enols and enolates and their alkylation, aldol reaction, aromatic heterocyclics, their reactivity and reactions.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

35 hours of lectures, 7 hours of exercises, 65 hours of self-study

Target group:

Chemistry

Prerequisites and co-requisites:

Organic Chemistry I (780389A)

Recommended optional programme components:

The contents and credits of this course are the same as in the course 783643S Organic Chemistry II 4 credits. The student can perform this course only once: 780393A Organic Chemistry II or 783643S Organic Chemistry II 4 credits.

Recommended or required reading:

Clayden, J., Greeves, N., Warren, S. ja Wothers, P.: Organic Chemistry, Oxford University Press, 2001. Chapters 19-21, 26, 27, and 43.

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. Marja Lajunen

Working life cooperation:

No

Other information:

The students, who started their studies 1st August, 2012 or later, perform this course in the B.Sc. degree.

780329A: Laboratory Course I in Organic Chemistry, 4 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Johanna Kärkkäinen, Juha Heiskanen

Opintokohteen kielet: Finnish

ECTS Credits:

4 credits/107 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 written 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:

2 h lectures (obligatory for all), 50 h/ laboratory of supervised, independent laboratory work and 55 h/lab of self-study and reporting.

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

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) passed.

Recommended optional programme components:

Participation in the course 780389A organic Chemistry I.

Recommended or required reading:

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

Assessment methods and criteria:

Works, reports and the preliminary 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. Laboratory works and reporting 2/3 and exam 1/3

Person responsible:

Ph.D. Juha Heiskanen

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.

780328A: Instrumental Analysis, 4 - 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Paavo Perämäki

Opintokohteen kielet: Finnish

Leikkaavuudet:

780324A Analytical Chemistry II 4.0 op

ECTS Credits:

4 credits /107 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 absorption and emission spectrometry, X-ray fluorescence spectrometry, molecular fluorescence, phosphorescence and chemiluminescence, NMR spectrometry, Mass spectrometry, Chromatography, Electroanalytical methods, Thermal analysis.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

40 hours of lectures + 6 hours of exercises + 61 hours of self-study

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

Introduction to Analytical Chemistry (780111P)

Recommended optional programme components:

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

Recommended or required reading:

Skoog, D.A., Holler, F.J., Crouch, S.R.: Principles of Instrumental Analysis, 6th ed., Thomson Brooks/Cole, 2007, partly.

Assessment methods and criteria:

Two intermediate examinations or one final examination

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 and Doc. Sampo Mattila

Working life cooperation:

No

Other information:

Students who have started their studies before 1st August, 2012 will perform the course as a course of 5 ECTS credits .

780379A: Literature of Chemistry and Communication Skills, 2 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

2 credits/53 hours of work

Language of instruction:

Finnish

Timing:

3rd autumn

Learning outcomes:

After this course the student can search and classify scientific information from various sources of chemical information. He/she can use computer-aided information retrieval, write a scientific report or prepare a poster. The student can apply principles of oral presentation for a talk, can 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:

Types of chemistry literature, information retrieval, word processing and chemical drawing etc. and their use in the preparation of the thesis. Ethical principles related to research. Preparation of a treatise, seminar talk and aposter, presentation of a poster.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

3rd autumn 20 hours of lectures, demonstrations, and exercises, poster seminar, group meetings due to preparation of candidate's thesis, 31 hours of self-study

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

No specific prerequisites

Recommended optional programme components:

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

Recommended or required reading:

Lecture handout

Assessment methods and criteria:

Preparation and presentation of a poster. Compulsory attendance at the lecture.

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

Grading:

The course utilizes verbal grading scale pass/fail.

Person responsible:

Prof. Marja Lajunen and Science and Technology Library Tellus

Working life cooperation:

No

Other information:

After the course the group meetings for guidance of candidate's thesis will continue.

780301A: Research Training, 9 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Teija Kangas, Leena Kaila, Juha Heiskanen

Opintokohteen kielet: Finnish

ECTS Credits:

9 credits/240 hours of work

Language of instruction:

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

Timing:

3rd 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: NIR-spectrophotometric study of hydrogen bonding, conductivity of an electrolytic solution, molecule modeling, adsorption, and surface tension
in Organic Chemistry: Preparation of UV- and IR samples, preparation of enamine, acylation of enamine, reduction of trans-cinnamaldehyde, chemical resolution of α -phenyl ethyl amine and qualitative analysis of three compounds.

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, 7th 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:

Lecturer L. Kaila, Ph.D. Sanna Komulainen, and Ph.D. Juha Heiskanen

Working life cooperation:

No

Other information:

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

Compulsory

780301A-01: Research Training, 3 op

Voimassaolo: 01.08.2006 -

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Leena Kaila

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits/ 80 hours of work

Language of instruction:

Finnish

Timing:

3rd 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:

Three laboratory projects on different fields of inorganic chemistry: ICP-OES-analysis, protonation constant, synthesis of an air sensitive compound. Additionally, written laboratory reports, one per practical.

Mode of delivery:

Face-to-face teaching, compulsory

Learning activities and teaching methods:

Laboratory work + reports 80 hours

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:

Material handed out in the laboratory

Assessment methods and criteria:

Laboratory works, reports and examination 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:

Lecturer L. Kaila

Working life cooperation:

No

Other information:

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

780301A-02: Research Training, 3 op

Voimassaolo: 01.08.2006 -

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Sanna Komulainen

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits/ 80 hours of work

Language of instruction:

Finnish

Timing:

3rd autumn

Learning outcomes:

Upon completion of the course, the student should have acquired knowledge and understanding of independent experimental physical chemistry and student can write a report based on experimental results.

Contents:

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.

Mode of delivery:

Course contains guided laboratory works which include independently written laboratory reports from the works.

Learning activities and teaching methods:

One preliminary exam at the beginning of the course (2 hours), pre-experimental works (8 hours) and 40 hours of laboratory experiments. Additionally, written laboratory reports, one per laboratory work (30 hours).

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

The compulsory courses of chemistry in the first and second year

Recommended optional programme components:

Physical Chemistry II

Recommended or required reading:

Practical work handout. Atkins, P.W. Physical Chemistry, 7 th ed. 2002, Oxford University Press, (or later ed.), partly

Assessment methods and criteria:

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:

Ph.D. Sanna Komulainen

Working life cooperation:

No

Other information:

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

780301A-03: Research Training, 3 op

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Juha Heiskanen

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits/ 80 hours of work

Language of instruction:

Finnish

Timing:

3rd autumn

Learning outcomes:

After completing this course, the student should be able to work independently in the laboratory. The student can perform a reaction sequence and is familiar with FTIR, ¹H-NMR and GC-MS analyses. The student can report results of a synthesis.

Contents:

Four different syntheses and qualitative analysis of a mixture of three unknown compounds. Written laboratory report from each practical. Written laboratory report from each practical.

Mode of delivery:

Face-to- face teaching in the laboratory

Learning activities and teaching methods:

2 h lectures (obligatory for all), 30 h/ laboratory of supervised, independent laboratory work and 48 h /lab of self-study and reporting

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

Completed first and second year chemistry courses in inorganic, physical and organic 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:

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

Assessment methods and criteria:

The assessment of the course is based on the learning outcomes of the course and they are followed by the results of the laboratory exercises and their reports. 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:

Juha Heiskanen

Working life cooperation:

No

Other information:

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

780300A: Thesis for the Degree of B.Sc., 6 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

6 credits/160 hours of work

Language of instruction:

Finnish, English on demand

Timing:

3rd autumn (beginning)

Learning outcomes:

After the writing the Thesis the student is able to show a good knowledge of the subject of his/her Thesis and can write a perfect command of either Finnish or Swedish on the basis of existing scientific data.

Contents:

A thesis of approximately 20-40 pages including about 30 references. In addition, the student takes a maturity examination on the subject of the B.Sc. thesis.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

160 hours of self-study

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

The first and second year courses in chemistry and the course Literature of Chemistry and Communication Skills.

Recommended optional programme components:

Writing the thesis is based on the course Literature of Chemistry and Communication Skills.

Recommended or required reading:

Material given by the supervisor

Assessment methods and criteria:

Literature survey on the given research topic and a talk on it given in a seminar (780380A Seminar for the Degree of B.Sc)

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:

Professors, Docents, Doctor level Senior Assistants and Lectures of the Chemistry Department.

Working life cooperation:

No

Other information:

Writing of the thesis is guided in group meetings. Compulsory attendance.

The thesis must be sent to the Urkund system before evaluation (<http://www oulu.fi/urkund/opiskelijalle.html>).

780380A: Seminar for the Degree of B.Sc., 1 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

1 credits /27 hours of work

Language of instruction:

Finnish

Timing:

3rd spring

Learning outcomes:

Improving oral/aural skills connected to the student's academic field as well as in everyday conversational situations.

Contents:

The student gives one presentation on a given scientific subject related to B.Sc. thesis (20 min.) and distributes an abstract to the audience.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Students register for the course in the beginning of autumn or spring term. Compulsory attendance.

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

The B.Sc. Thesis

Recommended optional programme components:

Thesis for the degree of B.Sc. (780300A)

Recommended or required reading:

Material in the B.Sc. Thesis

Assessment methods and criteria:

Compulsory attendance in the seminar and approved own seminar talk
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 and Lecturer Minna Tiainen

Working life cooperation:

No

Other information:

Enrolment for the course is done through WebOod in the beginning of the autumn or spring term.

780381A: Maturity test, 0 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department 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:

3rd spring

Learning outcomes:

Upon completion the maturity test the student has shown that he/she can describe his/her research topic in a logical and crisp 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

Electives

780344A: Industrial Training IV, 8 op

Opiskelumuoto: Intermediate Studies

Laji: Practical training

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

8 credits/ 480 hours of practical training

Language of instruction:

Finnish/English on demand

Timing:

2nd or 3rd year

Learning outcomes:

Upon completion the course, the student is able to discuss about working life his/her own specialisation line in industry. The student can analyze and evaluate the things which he/she learned during the the course.

Contents:

Instructed working in an (industrial)laboratory or research institute

Mode of delivery:

Face-to-face teaching and working in the training job

Learning activities and teaching methods:

Work practice during summer

Target group:

Chemistry, optional. The course is only for the major students.

Prerequisites and co-requisites:

The first year studies in chemistry at least.

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 received in the training job

Assessment methods and criteria:

Instructed practicing in industry or in a research institute. Three weeks working gives two credits.
Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

The course utilizes verbal grading scale pass/fail.

Person responsible:

Teachers, Amanunesis

Working life cooperation:

Yes

Other information:

The course can be performed as foreign industrial training (<http://www oulu.fi/english/studying/internship-offers-abroad#2>).

780372A: Basic Principles of Green Chemistry, 4 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Toivo Kuokkanen, Minna Tiainen

Opintokohteen kielet: Finnish

Leikkaavuudet:

780355A	Environmental Chemistry and Hazardous Wastes	4.0 op
780360A	Environmental Chemistry and Hazardous Wastes	5.5 op
780375A	Basic Principles of Green Chemistry	2.0 op

ECTS Credits:

4 credits/107 hours of work

Language of instruction:

Finnish

Timing:

Spring term

Learning outcomes:

Upon completion the student should have understanding of twelve principles of green chemistry and the principles of hazardous waste management.

Contents:

Environmental friendly chemistry. The principles of green chemistry with examples of real life, classification, utilization, refining and disposal of environmentally hazardous wastes. Hazardous Waste Management of the University of Oulu.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

37 hours of lectures, 70 hours of self-study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

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:

Lancaster M.: Green Chemistry: An introductory text, RSC, 2002. Material given in the lecture (hazardous wastes).

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:

Lecturer Minna Tiainen

Working life cooperation:

NO

Other information:

No

780373A: Environmental Chemistry, 3 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Minna Tiainen

Opintokohteen kielet: Finnish

Leikkaavuudet:

780359A	Environmental Chemistry	4.0 op	
780355A	Environmental Chemistry and Hazardous Wastes	4.0 op	
780316A	Environmental Chemistry	2.0 op	
780360A	Environmental Chemistry and Hazardous Wastes	5.5 op	

ECTS Credits:

3 credits/80 hours of work

Language of instruction:

Finnish

Timing:

Autumn

Learning outcomes:

Upon completion the student should have acquired an understanding of chemistry of atmosphere, hydrosphere and terrestrial environment.

Contents:

Fundamentals of environmental chemistry; chemistry of the soil, natural and waste waters and atmosphere, circulation of chemical compounds in the nature, chemical releases, environmentally toxic and other noxious compounds, environmental analytics and basics of physical measurements.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

30 hours of lectures, essay 20 hours, self-study 30 hours

Target group:

Chemistry, optional

Prerequisites and co-requisites:

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:

van Loon, G.W. & Duffy, S.J.: Environmental Chemistry, A Global Perspective, Oxford, 2000.

Assessment methods and criteria:

Final examination. Grading: 70% final examination, 30% essay.

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

802151P: Introduction to mathematical deduction, 5 op

Voimassaolo: 01.08.2009 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Mathematical Sciences

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay802151P Introduction to mathematical deduction (OPEN UNI) 5.0 op

ECTS Credits:

5 ECTS

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 techniques
- is able to use basic set theoretic concepts and definitions
- is able to define and apply basic definitions related to functions

Contents:

The course is an introduction to mathematical deduction and introduces different types of proof techniques. The course covers the concepts familiar from upper secondary school studies more profoundly. Main concepts in this course are basic set theory and functions.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 30h, exercises 18h

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:

Tero Vedenjuoksu

Working life cooperation:

-

477012P: Introduction to Automation Engineering, 5 op**Voimassaolo:** 01.08.2005 - 31.07.2013**Opiskelumuoto:** Basic Studies**Laji:** Course**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Hiltunen, Jukka Antero, Aki Sorsa, Harri Aaltonen, Leiviskä, Kauko Johannes**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

488010P Introduction to Process and Environmental Engineering II 5.0 op

470433A Introduction to Control Engineering 5.0 op

470304S Fundamentals of Process Automation 2.5 op

Ei opintojaksokuvauksia.

488011P: Introduction to Environmental Engineering, 5 op**Voimassaolo:** 01.08.2005 - 31.12.2013**Opiskelumuoto:** Basic Studies**Laji:** Course**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Jarmo Sallanko**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

488010P Introduction to Process and Environmental Engineering II 5.0 op

480002A Basics of Environmental Technology 5.0 op

Ei opintojaksokuvauksia.

477011P: Introduction to Process and Environmental Engineering I, 5 op**Voimassaolo:** 01.08.2005 -**Opiskelumuoto:** Basic Studies**Laji:** Course**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Aki Sorsa**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

470219A Introduction to Process Engineering 3.5 op

ECTS Credits:

5 cr

Language of instruction:

Finnish

Timing:

Implementation during periods 1-3

Learning outcomes:

Objective: To give insight to the whole perspective of process and environmental engineering and to familiarise the students with the terminology involved. The objective is also to outline the connections between process and environmental engineering and other fields closely related to them.

Learning outcomes: After the course, the student can analyse the process and environmental engineering aspects of an industrial process. He/She can, for example, divide the process into unit processes, analyse the process or a chain of processes based on the material balances, identify and evaluate the significance of essential mechanical, chemical and transport phenomena, analyse the control and process design aspects of a process etc. He/She can also evaluate the significance of different aspects of process and environmental engineering to the overall production system when these aspects are further examined in forthcoming courses.

Contents:

The course divides into eight separate themes: 1. Unit processes and material balances. 2. Environmental impacts and their classification. 3. Mechanical phenomena. 4. Momentum, heat and mass transfer phenomena. 5. Chemical reactions and reactors. 6. The possibilities of biological process engineering. 7. Process dynamics and control. 8. Process measurements and measurability.

Mode of delivery:

Contact lectures

Learning activities and teaching methods:

Assignments (8 altogether) carried out in small groups and contact lectures supporting them (16 hours).

Target group:

Bachelor's degree students in the Department of Process and Environmental Engineering

Prerequisites and co-requisites:

None

Recommended optional programme components:

The course serves as an introduction to the studies in process and environmental engineering.

Recommended or required reading:

The material is provided during the contact lectures and through the course webpages. It is expected also that the students seek the material for completing the assignments independently.

Assessment methods and criteria:

The assignments (8 altogether) covering the course themes carried out in small groups.

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

Grading:

The course utilises a numerical grading scale 1-5 and fail.

Person responsible:

M.Sc. (eng) Aki Sorsa

Working life cooperation:

No.

Other information:

The assessment method utilised requires the attendance in contact lectures from the beginning of the course.

771102P: Basic course in mineralogy, 6 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Geosciences

Arvostelu: 1 - 5, pass, fail

Opettajat: Pekka Tuisku, Hanna Junttila

Opintokohteen kielet: Finnish

ECTS Credits:

6 credits

Language of instruction:

Finnish

Timing:

1st year, autumn semester

Learning outcomes:

Students obtain a basic knowledge on mineralogy.

Contents:

Crystal, crystal systems, mineral, rocks. Formation of minerals in geological processes, chemical and physical properties of minerals, occurrence and utilization.

Mode of delivery:

Face to face

Learning activities and teaching methods:

20 h lectures, 16 h exercises. Exercises are compulsory.

Target group:

1st year geosciences students

Prerequisites and co-requisites:

No

Recommended optional programme components:

-

Recommended or required reading:

Risto Piispanen ja Pekka Tuisku (2005) Mineralogian perusteet. <http://cc.oulu.fi/~petuisku/Mineralogia/MinPer.htm>

Assessment methods and criteria:

Examination, compulsory exercises

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

Grading:

1-5/fail

Person responsible:

P. Tuisku

Working life cooperation:

No

Other information:

-

771101P: Endogenic processes, 4 op

Voimassaolo: - 31.08.2011

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Geosciences

Arvostelu: 1 - 5, pass, fail

Opettajat: Seppo Gehör

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

771109P: Exogenic Processes, 3 op

Voimassaolo: - 31.07.2011

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Geosciences

Arvostelu: 1 - 5, pass, fail

Opettajat: Peuraniemi, Vesa Juhani

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

772103P: Field course in bedrock geology, 3 op

Voimassaolo: 01.08.2006 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Geosciences

Arvostelu: 1 - 5, pass, fail

Opettajat: Kärki, Aulis Juhani

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits

Language of instruction:

Finnish/ English

Timing:

1st year, spring semester

Learning outcomes:

Upon completion of the course, students should be able to identify rocks and minerals in the field and recognize main features of the Finnish bedrock.

Contents:

Methods of description and identification of rock types and bedrock units in the field work. Map types (geological, geophysical, topographic maps) and usage of geologist's field tools.

Mode of delivery:

Face to face teaching in the field

Learning activities and teaching methods:

Field works and demonstrations, short presentation on the given subject.

Target group:

First year geology students

Prerequisites and co-requisites:

Basic studies in geosciences

Recommended optional programme components:

The field course is complementary to the lecture course "Introduction to bedrock geology of Finland" by introducing the students the "cross section" of the Finnish bedrock in the field.

Assessment methods and criteria:

Compilation of a learning diary

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

Pass/fail

Person responsible:

A. Kärki

Working life cooperation:

No

Other information:

-

771108P: Introduction to Ore Geology, 2 op**Opiskelumuoto:** Basic Studies**Laji:** Course**Vastuuyksikkö:** Department of Geosciences**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Eero Hanski**Opintokohteen kielet:** Finnish**ECTS Credits:**

2 credits

Language of instruction:

finnish

Timing:

1st spring

Learning outcomes:

Students will a general view on the raw materials, their environmental impacts and exploration.

Contents:

Aspects of mineral economy, environmental impacts of raw material production and use, classification of ores and ore-forming processes, examples of ore types of abundant and scarce elements, methods of ore exploration, mining legislation.

Mode of delivery:

Face to face teaching

Learning activities and teaching methods:

14 h lectures

Target group:

all geology students

Recommended or required reading:

Craig, J.R., Vaughan, D.J. & Skinner, B.J.: Resources of the Earth - Origin, Use, and Environmental Impact. Prentice Hall, 1996, 472 p.

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

Assessment methods and criteria:

written examination

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

Grading:

1-5/fail

Person responsible:

S. Gehör

Working life cooperation:

No

771106P: Introduction to bedrock geology of Finland, 2 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Geosciences

Arvostelu: 1 - 5, pass, fail

Opettajat: Kärki, Aulis Juhani

Opintokohteen kielet: Finnish

ECTS Credits:

2 credits

Language of instruction:

Finnish

Timing:

1st year, spring semester

Learning outcomes:

After the course students know main geological features of bedrock of Finland and main features of lithostratigraphy and chronostratigraphy.

Contents:

The main geological features of the bedrock of Finland including its structure, age and orogenic evolution.

Mode of delivery:

Face to face teaching

Learning activities and teaching methods:

Lectures 10 h and self-study 30 h

Target group:

First year geology students and students of secondary subject

Prerequisites and co-requisites:

The required prerequisite is the participation in the following courses: Introduction to mineralogy, Endogenic processes, Exogenic processes.

Recommended optional programme components:

-

Recommended or required reading:

Lehtinen, M., Nurmi, P. ja Rämö, T., 1998: Suomen Kallioperä, Suomen Geologinen Seura; *or* selected parts from Lehtinen et al. (eds.) 2005. Precambrian Geology of Finland. Elsevier, Amsterdam, 736 s.

<http://www.geologinenseura.fi/suomenkalliopera/index.html>

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

Assessment methods and criteria:

Examination

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

Grading:

The course unit utilizes a numerical grading scale 1-5/ fail.

Person responsible:

A. Kärki

Working life cooperation:

No

771107P: Introduction to historical geology and surficial geology of Finland, 2 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Geosciences

Arvostelu: 1 - 5, pass, fail

Opettajat: Peuraniemi, Vesa Juhani

Opintokohteen kielet: Finnish

ECTS Credits:

2 credits

Language of instruction:

Finnish

Timing:

1st year, spring semester

Learning outcomes:

Upon completion of the course, students should have acquired basic knowledge of the Finnish preglacial and Quaternary deposits and the main features of the history of life and geological time table.

Contents:

Main features and origin of the Finnish preglacial and Quaternary deposits. Historical geology: Geological time table, main features of the history of life, mass extinctions.

Mode of delivery:

Face to face

Learning activities and teaching methods:

10 h lectures

Target group:

1st year geoscience students

Prerequisites and co-requisites:

-

Recommended optional programme components:

-

Recommended or required reading:

Monroe, J.S. & Wicander, R.: The Changing Earth. Exploring Geology and Evolution. Brooks/Cole, 2001. Pages 514-537, 560-733.

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

Assessment methods and criteria:

Examination

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

Grading:

1-5/fail

Person responsible:

V. Peuraniemi

Working life cooperation:

No

Other information:

-

771104P: Quaternary geology, 5,5 op

Voimassaolo: - 31.07.2010

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Geosciences

Arvostelu: 1 - 5, pass, fail

Opettajat: Peuraniemi, Vesa Juhani

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

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

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Language Centre

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Proficiency level:

B2/C1 on the [Common European Framework of Reference](#) scale.

Status:

In the Faculty of Science, this course is mandatory for all degree programmes except Geography. Please consult the Faculty Study Guide to establish the language requirements for your own degree programme.

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 credits (total work load 54 hours including classroom meetings.)

Language of instruction:

English

Timing:

Biology: 1st year spring term

Chemistry: 1st year autumn term

Geology: 1st year spring term

Information Processing Science: 1st year spring term

Mathematical Sciences: 1st year spring term

Physical Sciences: 1st year autumn term

Learning outcomes:

By the end of the course, you are expected

- to have acquired effective vocabulary learning techniques by being able to distinguish parts of words to infer meanings
- to understand and be able to construct basic grammatical structures used in formal written English
- to be able to utilize text structure and cohesion markers when reading academic texts
- to be able to apply effective reading techniques and have necessary skills to extract global and detailed information with considerable ease and speed from general texts related to Natural Sciences as well as texts /textbooks of their own field

Contents:

In this course, students improve their understanding of written academic English used in texts in Natural Sciences as well as expand their general and scientific vocabulary. Students become aware of their own role in learning and use a variety of different study methods in order to develop their own language learning strategies, which will enhance their academic English.

Mode of delivery:

Contact teaching

Learning activities and teaching methods:

Contact teaching (26 hours) and self-study 28 hours

Target group:

1st year students of Biology, Chemistry, Geology, Information Processing Science, Physics, and Mathematics

Prerequisites and co-requisites:

-

Recommended optional programme components:

In addition to this course, students are required to take 902004Y Scientific Communication.

Recommended or required reading:

Set books for substance studies; journal articles in print and on-line.

Assessment methods and criteria:

Continuous assessment takes into account active and regular participation in classroom sessions and successful completion of all homework tasks, vocabulary quizzes, and an end of course exam.

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

Grading:

Pass/Fail

Person responsible:

Biology, Geology, Information Processing: Karen Niskanen

Chemistry, Physics, Mathematics: Patrick Nesbitt

Working life cooperation:

-

Other information:

N.B. Students with grades *laudatur* or *eximia* in their A1 English school-leaving examination can be exempted from this course and will be granted the credits by the Faculty of Science.

Retake examinations: Two retake examinations are allowed on the dates set by the Extension School. See the dates and registration instructions at: <http://www.oulu.fi/kielikoulutus>

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

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Language Centre

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 CEFR scales

Status:

This course is mandatory for all 2nd year students (except **geographers**) who will have English as their foreign language in their B.Sc. degree. This includes the students who were exempted from 'Reading for Academic Purposes'(902002Y). Please consult the faculty study guide to establish the language requirements on your own degree programme.

Required proficiency level:

Students taking this course must have had English as the A1 or A2 language at school or the equivalent English skills should have been acquired otherwise. The course 'Reading for Academic Purposes' (902002Y) is a pre-requisite, unless exempted.

ECTS Credits:

The student workload is 53 hrs work/ 2 ECTS credits.

Language of instruction:

English

Timing:

Biology: 2nd year autumn term

Chemistry: 2nd year spring term

Geology: 2nd year spring term

Information Processing Science : 2nd year autumn term

Mathematics: 2nd year spring term

Physics: 2nd year autumn term

Learning outcomes:

By the end of the course, you are expected:

1. to have provided evidence of oral fluency in pair work communication and small group discussions.
2. to have developed effective language learning strategies through autonomous homework.
3. to have demonstrated the ability to prepare and present scientific subjects, using appropriate field-related vocabulary.
4. to have demonstrated lecture listening skills in field-related situations.

Contents:

Skills in listening, speaking, and giving presentations are practised in the course. Homework tasks include autonomous work to support the classroom learning and the task of preparing and presenting a scientific presentation.

Mode of delivery:

Contact teaching

Learning activities and teaching methods:

Contact teaching 28 hours, homework 28 hours

Target group:

2nd year students of Biology, Chemistry, Geology, Information Processing Science, Mathematics, Physics

Prerequisites and co-requisites:

-

Recommended optional programme components:

Also required: [902002Y Reading for Academic Purposes Englannin kieli 1](#)

Recommended or required reading:

Course materials will be provided by the teacher and a copy fee will be charged.

Assessment methods and criteria:

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

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

Grading:

Pass / fail.

Person responsible:

Jolene Gear

Working life cooperation:

-

Other information:

Alternative method of course completion: An optional exemption test is offered twice per year. The student can only participate in the exemption exam once. See [exemption exam details and schedule](#).

780078Y: Orientation Course for New Students, 1 op

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Kopsa-Moilanen, Vieno Maria

Opintokohteen kielet: Finnish

ECTS Credits:

1 credits/27 hours of work

Language of instruction:

Finnish

Timing:

1st autumn and 1st 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 department of chemistry, Orientation in small groups, and PSP (Personal Study Plan).

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

The autumn term: The programme of the orientation week and the tours in the Department of Chemistry, Orientation in small groups: 10-15 hours of visits and discussions with the group tutor. Making of PSP (Personal Study Plan) (in webodi) is started; The spring term: the planning of PSP is completed.

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 Department of Chemistry, 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:

Professor Marja Lajunen, Lecturer L. Kaila, Amanuensis, and Small group tutors.

Working life cooperation:

No

Other information:

The course is completed when all the four parts are passed.

901004Y: Swedish, 2 - 3 op

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Language Centre

Opintokohteen kielet: Swedish

Leikkaavuudet:

901035Y Second Official Language (Swedish), Oral Skills 1.0 op

901034Y Second Official Language (Swedish), Written Skills 1.0 op

ay901004Y Swedish (OPEN UNI) 2.0 op

Proficiency level:

B1/B2/C1 (CEFR scale)

Status:

This course is compulsory to all students except those who have at least 60 ECTS credits of Swedish studies in their degrees. The language proficiency provided by the course unit is equivalent to the language proficiency required of a state official with an academic degree working in a bilingual municipality area (Act 424/03 and Decree 481/03).

Required proficiency level:

The required starting proficiency level for students of all faculties is a grade of 7 or higher from the Swedish studies at secondary school (B-syllabus) or matriculation examination grade A - L or a passing grade from the Brush up course in Swedish 901018Y.

If a student doesn't meet these requirements or his/her language skills are otherwise lacking, he/she must achieve the required proficiency level BEFORE taking this compulsory Swedish course

ECTS Credits:

2 ECTS credits (Biochemistry 3 ECTS credits)

Language of instruction:

Swedish

Timing:

See the study guide of the Faculty of Science.

Learning outcomes:

Upon completion of the course the student should have acquired the necessary proficiency level in Swedish to be able to manage in the most common communication situations related to his/her professional work tasks. He/she should be able to use basic grammatical structures fairly well in both speech and writing. He/she should be able to use the most common situational phrases understandably in various communication situations. He/she should be able to find the main points in general academic texts and texts related to his/her field of study and relay this information to colleagues or an audience of laymen using Swedish. He/she should be able to write short texts relating to his/her field of study.

Contents:

Communicative oral and written exercises, which aim to develop the student's Swedish proficiency in areas relevant to his/her academic field and future professional tasks. The student practises oral presentation and pronunciation. Situational oral exercises done individually and in pairs and groups. Discussions in small groups. Current texts about the student's special field. Listening comprehension exercises. Written exercises relating to the student's professional field.

Mode of delivery:

Contact teaching

Learning activities and teaching methods:

2 ECTS credits: 28 hours of contact teaching (1 x 180 minutes per week) and related exercises, self-directed study. The course unit's total workload is 53 hours.

3 ECTS credits (biochemistry): 45 hours of contact teaching (2 x 90 minutes per week) and related exercises, 35 hours of self-directed study. The course unit's total workload is 80 hours.

Target group:

Students of the Faculty of Science

Prerequisites and co-requisites:

See Required Proficiency Level

Recommended optional programme components:

-

Recommended or required reading:

The material, which is special field-specific, authentic and up to date, is distributed during the course. Students must pay for their course material.

Assessment methods and criteria:

The course focuses on improving both oral and written language skills and requires active attendance and participation in exercises, which also require preparation time. 100% attendance is required. The course unit tests both oral and written language skills. Students participate in the teaching in either autumn semester or spring semester.

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

Grading:

Assessment is based on continuous assessment and exams. Approved completion of the course unit requires that the student achieves at least satisfactory oral and written language skills. The grades are based on continuous assessment and the course exams. Oral and written language skills are graded separately. The possible grades are satisfactory skills (CERF proficiency level B1) and good skills (CERF proficiency levels B2-C1). For more information on the proficiency levels of oral and written language skills, see Assessment Criteria (in Finnish).

Person responsible:

Lecturer Rauno Varonen

Working life cooperation:

-

Other information:

Teaching will begin according to the schedule

780079Y: Tutoring, 1 op

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Kopsa-Moilanen, Vieno Maria

Opintokohteen kielet: Finnish

ECTS Credits:

1 credits/ 27 hours of work

Language of instruction:

Finnish

Timing:

2nd autumn or 3rd 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: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

Ei opintojaksokuvauksia.

be

780114P: General and Inorganic Chemistry I, 6 op

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Leena Kaila

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay780117P General and Inorganic Chemistry A (OPEN UNI) 5.0 op

ay780118P General and Inorganic Chemistry B (OPEN UNI) 5.0 op

780113P Introduction to Chemistry 12.0 op

780109P Basic Principles in Chemistry 4.0 op

780101P Introduction to Physical Chemistry 7.0 op

780102P Introduction to Inorganic Chemistry 5.0 op

780109P Basic Principles in Chemistry 4.0 op

ECTS Credits:

6 credits/160 hours of work

Language of instruction:

Finnish

Timing:

1 st Autumn

Learning outcomes:

After this course the student should 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, thermodynamics, electrons in atoms, periodic table, chemical bond.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

40 hours of lectures and applications, 24 hours of exercises and 96 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:

This course is a part of the earlier lectured course 780113P Introduction to Chemistry (12 credits).

Recommended or required reading:

Petrucci, R.H., Herring, F.G., Madura, J.D. ja Bissonnette, C.: General Chemistry: Principles and Modern Applications, 10. painos (myös 7., 8. ja 9. painos), Pearson Canada Inc., Toronto, 2011. Chapters 1-11, 12.5-7, 13.2, 19.1-5.

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:

Lecturer Leena Kaila

Working life cooperation:

No

Other information:

No

780115P: General and Inorganic Chemistry II, 6 op

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Leena Kaila

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay780117P	General and Inorganic Chemistry A (OPEN UNI)	5.0 op
ay780118P	General and Inorganic Chemistry B (OPEN UNI)	5.0 op
780113P	Introduction to Chemistry	12.0 op
780101P	Introduction to Physical Chemistry	7.0 op
780102P	Introduction to Inorganic Chemistry	5.0 op
780109P	Basic Principles in Chemistry	4.0 op

ECTS Credits:

6 credits/160 hours of work

Language of instruction:

Finnish

Timing:

1 st Autumn

Learning outcomes:

After this course the student should understand basic concepts of chemistry as described in international general chemistry curriculum.

Contents:

Intermolecular forces, phase equilibrium, reaction kinetics, chemical equilibrium, acid-base equilibrium, equilibrium in water solutions of slightly soluble salts, electrochemistry.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

40 hours of lectures and applications, 26 hours of exercises, 94 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:

This course is a part of the earlier lectured course 780113P Introduction to Chemistry.

Recommended or required reading:

Petrucci, R.H., Herring, F.G., Madura, J.D. ja Bissonnette, C.: General Chemistry: Principles and Modern Applications, 10. painos (myös 7., 8. ja 9. painos), Pearson Canada Inc., Toronto, 2011. Chapters 12.1-4, 13-18, 19.6-8,20.

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:

Lecturer Leena Kaila

Working life cooperation:

No

Other information:

No

780103P: Introduction to Organic Chemistry, 6 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Johanna Kärkkäinen, Marja Lajunen

Opintokohteen kielet: Finnish

Leikkaavuudet:

780112P Introduction to Organic Chemistry 4.0 op

780103P2 Organic Chemistry I 6.0 op

780108P Basic Course in Organic Chemistry 6.0 op

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

6 credits/160 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 explain organic chemistry fundamentals, basic concepts and terminology, can use them for description of organic chemistry phenomena. He/she can name organic structures, explain their properties, deduce basic reaction types and solve their mechanisms.

Contents:

Basic reactions of organic compounds, basic principles of stereochemistry and reaction mechanisms: Addition, elimination, substitution, including electrophilic aromatic substitution, reactions of carbonyl group. Applications.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

52 hours of lectures and applications plus 6 hours of exercises, 102 hours of independent self-study

Target group:

Biochemistry, Chemistry, compulsory. In the study entity of 25 credits compulsory. Physical Sciences, 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, 10th 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:

Three 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. Marja Lajunen and Ph.D. Johanna Kärkkäinen

Working life cooperation:

No

Other information:

No

780111P: Introduction to Analytical Chemistry, 4 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Paavo Perämäki

Opintokohteen kielet: Finnish

Leikkaavuudet:

780110P Analytical Chemistry I 5.5 op

ECTS Credits:

4 credits /107 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 + 10 hours of exercises + 67 hours of self-study

Target group:

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

Prerequisites and co-requisites:

General and Inorganic Chemistry I and II (780114P and 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.: Analyttisen kemian perusteet, Oulun yliopistopaino, 2004.

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

780122P: Introductory Laboratory Course in Chemistry, 3 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits/80 hours of work

Language of instruction:

Finnish

Timing:

1st autumn or 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 tools and can use them properly. He/she can perform basic inorganic determinations: acid-base titrations, mass analysis or spectroscopic measurements and can apply them to analyze inorganic synthetic products, or use study thin layer chromatography to study purity of organic products. The student can write a report related to the performance and analysis of the synthesis.

Contents:

Laboratory safety, Bunsen burner, balances, volumetric measures, gravimetric determination, acid-base titration, pH, titration curves, acid-base indicators, buffer solutions, synthesis and analysis of an inorganic product, spectrophotometric determination, an organic synthesis, TLC. Written report.

Mode of delivery:

Supervised laboratory work

Learning activities and teaching methods:

Safety in laboratory 2 hours, 40 hours of laboratory work + demonstrations, 38 hours of self study

Target group:

Biochemistry, Biology, Chemistry, Process Engineering, Environmental engineering, compulsory. In the entity of 25 credits, compulsory. Physical Sciences, Geology, Mathematical Sciences, optional.

Prerequisites and co-requisites:

Basic Principles in Chemistry (780109P) or Introduction to Chemistry (780113P) passed, or participation in the courses General and Inorganic Chemistry I (780114P) and General and Inorganic Chemistry II (780115P).

Recommended optional programme components:

The course Basic Principles in Chemistry (780109P) or Introduction to Chemistry (780113P) passed, or Biochemistry, Chemistry and teacher education students of Mathematics and Physics: simultaneous participation in the courses General and Inorganic Chemistry I (780114P) and General and Inorganic Chemistry II (780115P).

Recommended or required reading:

Instruction Book (in Finnish): Kemian perustyöt

Assessment methods and criteria:

Final examination. Laboratory works 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:

Prof. Marja Lajunen and teaching assistants

Working life cooperation:

No

Other information:

Attendance at the lecture of Safety at work is compulsory. 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: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

Compulsory

780353A: Inorganic Chemistry I, 6 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

780356A Inorganic Chemistry 9.0 op

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

6 credits/160 hours of work

Language of instruction:

Finnish

Timing:

2nd spring

Learning outcomes:

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

Contents:

Atomic structure, chemical bond and molecular structure, molecular symmetry, solid state chemistry, acid-base theories, oxidation-reduction reactions, overview of main group chemistry.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

40 hours of lectures, 16 hours of exercises, self-study (including 8 home assignments) 104 hours

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

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:

Atkins, P., Overton, T., Rourke, J., Weller, M., and Armstrong, F., Inorganic Chemistry, 5th ed., Oxford University Press, 2009. Chapters 1-6, 8.

Assessment methods and criteria:

The assessment of the course is based on the final examination and home assignments
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. Risto Laitinen

Working life cooperation:

No

Other information:

No additional information

780391A: Inorganic Chemistry II, 4 op

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

781642S Inorganic Chemistry II 4.0 op

780356A Inorganic Chemistry 9.0 op

ECTS Credits:

4 credits / 107 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 and bonding 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:

22 hours of lecture, 16 hours of exercises, self-study (including 8 home assignments) 69 hours

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

Inorganic Chemistry I (780353A) 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:

Atkins, P., Overton, T., Rourke, J., Weller, M. ja Armstrong, F.: Inorganic Chemistry, 5. painos, Oxford University Press, Oxford 2009. Chapters 7, 19-23, 26-27.

Assessment methods and criteria:

The assessment of the course is based on the final examination and home assignments. 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:

Doc. Raija Oilunkaniemi

Working life cooperation:

No

Other information:

The content and credits of this course are the same as in the course 781642S Inorganic Chemistry II. The student can perform this course only once: 780391A Inorganic Chemistry II or 781642S Inorganic Chemistry II.

780330A: Laboratory Course I in Inorganic Chemistry, 7 op**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Department of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Leena Kaila**Opintokohteen kielet:** Finnish**ECTS Credits:**

7credits /187 hours of work

Language of instruction:

Finnish

Timing:

Part 1 (780330A-01): 1st spring

Part 2 (780330A-02): 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 and basic inorganic synthetic chemistry.

Contents:

Part 1: Introduction to inorganic ion reactions and a qualitative analysis

Part 2: Water analysis, neutralization, synthesis and characterization of two complex compounds

Mode of delivery:

Face-to-face teaching, compulsory

Learning activities and teaching methods:

Part 1: 45 hours of laboratory work, 10 hours of work reports + final examination

Part 2: 80 hours of laboratory work, 44 hours of work reports + final examination, 8 hours of self-study.

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

Part 1.: General and Inorganic Chemistry I and II (780114P and 780115P) or Introduction to Chemistry (780113p) or Introduction to Physical Chemistry (780101P9 and Introduction to Inorganic Chemistry (780102P). Introductory Laboratory Course in Chemistry (780122P).

Part 2.: General and Inorganic Chemistry I and II (780114P and 780115P) or Introduction to Chemistry (780113P) or Introduction to Physical Chemistry (780101P) and Introduction to Inorganic Chemistry (780102P), Introduction to Organic Chemistry (780103P or 780112P). Introductory Laboratory Course in Chemistry (780122P) and the first part of this laboratory course completed.

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:

Lecturer Leena Kaila, Lecturer Minna Tiainen and teaching assistants

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.

Compulsory

780330A-01: Laboratory Course I in Inorganic Chemistry (1. part), 2 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Minna Tiainen

Opintokohteen kielet: Finnish

ECTS Credits:

2 credits/ 53 hours of work

Language of instruction:

Finnish

Timing:

1st Spring

Learning outcomes:

At the end of the course, the students should have acquired an understanding of basic qualitative inorganic chemistry.

Contents:

Introduction to inorganic ion reactions and a qualitative analysis

Mode of delivery:

Face-to-face teaching, compulsory

Learning activities and teaching methods:

45 hours of laboratory work, 10 hours of work reports

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

General and Inorganic Chemistry I and II (780114P and 780115P) or Introduction to Chemistry (780113p) or Introduction to Physical Chemistry (780101P9 and Introduction to Inorganic Chemistry (780102P). Introductory Laboratory Course in Chemistry (780122P).

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.

Person responsible:

Lecturer M. Tiainen

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.

780330A-02: Laboratory Course I in Inorganic Chemistry (2. part), 5 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Leena Kaila

Opintokohteen kielet: Finnish

ECTS Credits:

5 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 classical quantitative inorganic chemistry and basic inorganic synthetic chemistry.

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, 44 hours of work reports + final examination, 8 hours of self-study.

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

General and Inorganic Chemistry I and II (780114P and 780115P) or Introduction to Chemistry (780113P) or Introduction to Physical Chemistry (780101P) and Introduction to Inorganic Chemistry (780102P), Introduction to Organic Chemistry (780103P or 780112P). Introductory Laboratory Course in Chemistry (780122P) and the first part of this laboratory course completed.

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. The works are 75% and the final examination 25 %.

Person responsible:

Lecturer Leena Kaila

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.

780347A: Physical Chemistry I, 6 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Pursiainen Jouni

Opintokohteen kielet: Finnish

Leikkaavuudet:

780318A Physical Chemistry II 6.5 op

ECTS Credits:

6 credits/160 hours of work

Language of instruction:

Finnish

Timing:

1 st 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. Chemical kinetics shows how the systems can reach equilibrium.

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, 90 hours of self-study

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

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, 22-23, or 9. edition or newest. Examination is based in the text book.

Assessment methods and criteria:

Weekly 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

780392A: Physical Chemistry II, 4 op

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

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

ECTS Credits:

4 credits / 107 hours of work

Language of instruction:

Finnish. English on demand.

Timing:

2nd Autumn

Learning outcomes:

After completing this course the students should have good knowledge of the basics of quantum mechanics and statistical mechanics and their role in physical chemistry.

Contents:

Basic of quantum mechanics, particle-in-box, hydrogen atoms, LCAO model for molecules. Basics of statistical mechanics, partition function and how to derive statistical properties from it. Ideal and real gases. Diffusion and electrical conductivity.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

36 hours of lecture, 8 hours of exercises, 62 hours of self-study

Target group:

Chemistry

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:

P.W. Atkins and J. de Paula, Atkins' Physical Chemistry, 8th ed., 2006 (or 7th ed., 2002), Oxford University Press, Chapters 8-11, 16-17, 21; or 9. ed. or newest ed.

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:

The contents and the credits of the course are the same as in the course 782631S Physical Chemistry II. The student can perform only one of them.

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

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Sanna Komulainen

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

780389A: Organic Chemistry I, 6 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Hormi Osmo

Opintokohteen kielet: Finnish

Leikkaavuudet:

780385A Organic Chemistry I 9.0 op

ECTS Credits:

6 credits/160 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, basics in physical organic chemistry especially the Hammett plot, details in nucleophilic substitution, conformation and stereochemistry in organic compounds.

Contents:

Molecular orbitals in organic compounds, conformation theory, Hammett plot, nucleophilic substitution and stereochemistry.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

50 hours of lectures, 110 hours self study

Target group:

Chemistry, compulsory. In the entity of 60 credits, compulsory.

Prerequisites and co-requisites:

Introduction to Organic Chemistry (780103P) and 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. and Wothers, P.: Organic Chemistry, Oxford University Press, 2001. Chapters 1-4, 7, 16-18, 34 ja 42 and pages 1090-1100.

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. Osmo Hormi

Working life cooperation:

No

Other information:

No

780393A: Organic Chemistry II, 4 op

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Marja Lajunen

Opintokohteen kielet: Finnish

Leikkaavuudet:

780386A Organic Chemistry II 9.0 op

783643S Organic Chemistry II 4.0 op

ECTS Credits:

4 credits/ 107 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 polar additions and eliminations, as well as reactions of carbonyl compounds as nucleophilic reagents. The student can compare and judge properties and reactions of aromatic heterocyclics and apply these to a practical synthetic route design.

Contents:

Polar additions and eliminations, enols and enolates and their alkylation, aldol reaction, aromatic heterocyclics, their reactivity and reactions.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

35 hours of lectures, 7 hours of exercises, 65 hours of self-study

Target group:

Chemistry

Prerequisites and co-requisites:

Organic Chemistry I (780389A)

Recommended optional programme components:

The contents and credits of this course are the same as in the course 783643S Organic Chemistry II 4 credits. The student can perform this course only once: 780393A Organic Chemistry II or 783643S Organic Chemistry II 4 credits.

Recommended or required reading:

Clayden, J., Greeves, N., Warren, S. ja Wothers, P.: Organic Chemistry, Oxford University Press, 2001. Chapters 19-21, 26, 27, and 43.

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. Marja Lajunen

Working life cooperation:

No

Other information:

The students, who started their studies 1st August, 2012 or later, perform this course in the B.Sc. degree.

780329A: Laboratory Course I in Organic Chemistry, 4 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Johanna Kärkkäinen, Juha Heiskanen

Opintokohteen kielet: Finnish

ECTS Credits:

4 credits/107 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 written 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:

2 h lectures (obligatory for all), 50 h/ laboratory of supervised, independent laboratory work and 55 h/lab of self-study and reporting.

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

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) passed.

Recommended optional programme components:

Participation in the course 780389A organic Chemistry I.

Recommended or required reading:

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

Assessment methods and criteria:

Works, reports and the preliminary 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. Laboratory works and reporting 2/3 and exam 1/3

Person responsible:

Ph.D. Juha Heiskanen

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.

780379A: Literature of Chemistry and Communication Skills, 2 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

2 credits/53 hours of work

Language of instruction:

Finnish

Timing:

3rd autumn

Learning outcomes:

After this course the student can search and classify scientific information from various sources of chemical information. He/she can use computer-aided information retrieval, write a scientific report or prepare a poster. The student can apply principles of oral presentation for a talk, can 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:

Types of chemistry literature, information retrieval, word processing and chemical drawing etc. and their use in the preparation of the thesis. Ethical principles related to research. Preparation of a treatise, seminar talk and poster, presentation of a poster.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

3rd autumn 20 hours of lectures, demonstrations, and exercises, poster seminar, group meetings due to preparation of candidate's thesis, 31 hours of self-study

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

No specific prerequisites

Recommended optional programme components:

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

Recommended or required reading:

Lecture handout

Assessment methods and criteria:

Preparation and presentation of a poster. Compulsory attendance at the lecture. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

The course utilizes verbal grading scale pass/fail.

Person responsible:

Prof. Marja Lajunen and Science and Technology Library Tellus

Working life cooperation:

No

Other information:

After the course the group meetings for guidance of candidate's thesis will continue.

780396A: Demonstrations in Physics and Chemistry, 2 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department 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:

Lecturer Leena Kaila

Working life cooperation:

No

Other information:

No

780301A: Research Training, 9 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Teija Kangas, Leena Kaila, Juha Heiskanen

Opintokohteen kielet: Finnish

ECTS Credits:

9 credits/240 hours of work

Language of instruction:

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

Timing:

3rd 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: NIR-spectrophotometric study of hydrogen bonding, conductivity of an electrolytic solution, molecule modeling, adsorption, and surface tension
in Organic Chemistry: Preparation of UV- and IR samples, preparation of enamine, acylation of enamine, reduction of trans-cinnamaldehyde, chemical resolution of α -phenyl ethyl amine and qualitative analysis of three compounds.

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, 7th 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:

Lecturer L. Kaila, Ph.D. Sanna Komulainen, and Ph.D. Juha Heiskanen

Working life cooperation:

No

Other information:

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

Compulsory

780301A-01: Research Training, 3 op

Voimassaolo: 01.08.2006 -

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Leena Kaila

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits/ 80 hours of work

Language of instruction:

Finnish

Timing:

3rd 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:

Three laboratory projects on different fields of inorganic chemistry: ICP-OES-analysis, protonation constant, synthesis of an air sensitive compound. Additionally, written laboratory reports, one per practical.

Mode of delivery:

Face-to-face teaching, compulsory

Learning activities and teaching methods:

Laboratory work + reports 80 hours

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:

Material handed out in the laboratory

Assessment methods and criteria:

Laboratory works, reports and examination 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:

Lecturer L. Kaila

Working life cooperation:

No

Other information:

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

780301A-02: Research Training, 3 op

Voimassaolo: 01.08.2006 -

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Sanna Komulainen

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits/ 80 hours of work

Language of instruction:

Finnish

Timing:

3rd autumn

Learning outcomes:

Upon completion of the course, the student should have acquired knowledge and understanding of independent experimental physical chemistry and student can write a report based on experimental results.

Contents:

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.

Mode of delivery:

Course contains guided laboratory works which include independently written laboratory reports from the works.

Learning activities and teaching methods:

One preliminary exam at the beginning of the course (2 hours), pre-experimental works (8 hours) and 40 hours of laboratory experiments. Additionally, written laboratory reports, one per laboratory work (30 hours).

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

The compulsory courses of chemistry in the first and second year

Recommended optional programme components:

Physical Chemistry II

Recommended or required reading:

Practical work handout. Atkins, P.W. Physical Chemistry, 7 th ed. 2002, Oxford University Press, (or later ed.), partly

Assessment methods and criteria:

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:

Ph.D. Sanna Komulainen

Working life cooperation:

No

Other information:

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

780301A-03: Research Training, 3 op

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Juha Heiskanen

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits/ 80 hours of work

Language of instruction:

Finnish

Timing:

3rd autumn

Learning outcomes:

After completing this course, the student should be able to work independently in the laboratory. The student can perform a reaction sequence and is familiar with FTIR, ¹H-NMR and GC-MS analyses. The student can report results of a synthesis.

Contents:

Four different syntheses and qualitative analysis of a mixture of three unknown compounds. Written laboratory report from each practical. Written laboratory report from each practical.

Mode of delivery:

Face-to-face teaching in the laboratory

Learning activities and teaching methods:

2 h lectures (obligatory for all), 30 h/ laboratory of supervised, independent laboratory work and 48 h /lab of self-study and reporting

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

Completed first and second year chemistry courses in inorganic, physical and organic 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:

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

Assessment methods and criteria:

The assessment of the course is based on the learning outcomes of the course and they are followed by the results of the laboratory exercises and their reports. 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:

Juha Heiskanen

Working life cooperation:

No

Other information:

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

780300A: Thesis for the Degree of B.Sc., 6 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

6 credits/160 hours of work

Language of instruction:

Finnish, English on demand

Timing:

3rd autumn (beginning)

Learning outcomes:

After the writing the Thesis the student is be able to show a good knowledge of the subject of his/her Thesis and can write a perfect command of either Finnish or Swedish on the basis of existing scientific data.

Contents:

A thesis of approximately 20-40 pages including about 30 references. In addition, the student takes a maturity examination on the subject of the B.Sc. thesis.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

160 hours of self-study

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

The first and second year courses in chemistry and the course Literature of Chemistry and Communication Skills.

Recommended optional programme components:

Writing the thesis is based on the course Literature of Chemistry and Communication Skills.

Recommended or required reading:

Material given by the supervisor

Assessment methods and criteria:

Literature survey on the given research topic and a talk on it given in a seminar (780380A Seminar for the Degree of B.Sc)

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:

Professors, Docents, Doctor level Senior Assistants and Lectures of the Chemistry Department.

Working life cooperation:

No

Other information:

Writing of the thesis is guided in group meetings. Compulsory attendance.

The thesis must be sent to the Urkund system before evaluation (<http://www.oulu.fi/urkund/opiskelijalle.html>).

780380A: Seminar for the Degree of B.Sc., 1 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

1 credits /27 hours of work

Language of instruction:

Finnish

Timing:

3rd spring

Learning outcomes:

Improving oral/aural skills connected to the student's academic field as well as in everyday conversational situations.

Contents:

The student gives one presentation on a given scientific subject related to B.Sc. thesis (20 min.) and distributes an abstract to the audience.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Students register for the course in the beginning of autumn or spring term. Compulsory attendance.

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

The B.Sc. Thesis

Recommended optional programme components:

Thesis for the degree of B.Sc. (780300A)

Recommended or required reading:

Material in the B.Sc. Thesis

Assessment methods and criteria:

Compulsory attendance in the seminar and approved own seminar talk
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 and Lecturer Minna Tiainen

Working life cooperation:

No

Other information:

Enrolment for the course is done through WebOod in the beginning of the autumn or spring term.

780381A: Maturity test, 0 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department 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:

3rd spring

Learning outcomes:

Upon completion the maturity test the student has shown that he/she can describe his/her research topic in a logical and crisp 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

*Electives***780395A: Chemistry for Teachers, 4 op**

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Leena Kaila

Opintokohteen kielet: Finnish

ECTS Credits:

4 credits /107 hours of work

Language of instruction:

Finnish

Timing:

2nd or 3rd year, before practicals in the pedagogical studies, spring

Learning outcomes:

After this course the student should understand basic concepts of chemistry and should be able to use demonstrations and laboratory experiments suitable in different levels of learning.

Contents:

Basic concepts in chemistry both in algorithmic and practical views.

Mode of delivery:

Face-to-face teaching, compulsory

Learning activities and teaching methods:

30 hours of lectures + excercises, 77 hours self-study

Target group:

Students in the teacher specialisation line, optional

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:

Material handed out by the teacher

Assessment methods and criteria:

Practical laboratory work and home work done and reported

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

Grading:

The course utilizes verbal grading scale pass/fail

Person responsible:

Lecturer Leena Kaila

Working life cooperation:

No

Other information:

No

780372A: Basic Principles of Green Chemistry, 4 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Toivo Kuokkanen, Minna Tiainen

Opintokohteen kielet: Finnish

Leikkaavuudet:

780355A	Environmental Chemistry and Hazardous Wastes	4.0 op
780360A	Environmental Chemistry and Hazardous Wastes	5.5 op
780375A	Basic Principles of Green Chemistry	2.0 op

ECTS Credits:

4 credits/107 hours of work

Language of instruction:

Finnish

Timing:

Spring term

Learning outcomes:

Upon completion the student should have understanding of twelve principles of green chemistry and the principles of hazardous waste management.

Contents:

Environmental friendly chemistry. The principles of green chemistry with examples of real life, classification, utilization, refining and disposal of environmentally hazardous wastes. Hazardous Waste Management of the University of Oulu.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

37 hours of lectures, 70 hours of self-study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

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:

Lancaster M.: Green Chemistry: An introductory text, RSC, 2002. Material given in the lecture (hazardous wastes).

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:

Lecturer Minna Tiainen

Working life cooperation:

NO

Other information:

No

780344A: Industrial Training IV, 8 op

Opiskelumuoto: Intermediate Studies

Laji: Practical training

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

8 credits/ 480 hours of practical training

Language of instruction:

Finnish/English on demand

Timing:

2nd or 3rd year

Learning outcomes:

Upon completion the course, the student is able to discuss about working life his/her own specialisation line in industry. The student can analyze and evaluate the things which he/she learned during the the course.

Contents:

Instructed working in an (industrial)laboratory or research institute

Mode of delivery:

Face-to-face teaching and working in the training job

Learning activities and teaching methods:

Work practice during summer

Target group:

Chemistry, optional. The course is only for the major students.

Prerequisites and co-requisites:

The first year studies in chemistry at least.

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 received in the training job

Assessment methods and criteria:

Instructed practicing in industry or in a research institute. Three weeks working gives two credits. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

The course utilizes verbal grading scale pass/fail.

Person responsible:

Teachers, Amanunesis

Working life cooperation:

Yes

Other information:

The course can be performed as foreign industrial training (<http://www.oulu.fi/english/studying/internship-offers-abroad#2>).

780373A: Environmental Chemistry, 3 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Minna Tiainen

Opintokohteen kielet: Finnish

Leikkaavuudet:

780359A	Environmental Chemistry	4.0 op
780355A	Environmental Chemistry and Hazardous Wastes	4.0 op
780316A	Environmental Chemistry	2.0 op
780360A	Environmental Chemistry and Hazardous Wastes	5.5 op

ECTS Credits:

3 credits/80 hours of work

Language of instruction:

Finnish

Timing:

Autumn

Learning outcomes:

Upon completion the student should have acquired an understanding of chemistry of atmosphere, hydrosphere and terrestrial environment.

Contents:

Fundamentals of environmental chemistry; chemistry of the soil, natural and waste waters and atmosphere, circulation of chemical compounds in the nature, chemical releases, environmentally toxic and other noxious compounds, environmental analytics and basics of physical measurements.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

30 hours of lectures, essay 20 hours, self-study 30 hours

Target group:

Chemistry, optional

Prerequisites and co-requisites:

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:

van Loon, G.W. & Duffy, S.J.: Environmental Chemistry, A Global Perspective, Oxford, 2000.

Assessment methods and criteria:

Final examination. Grading: 70% final examination, 30% essay.
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

410067P: Basic course in education, 4 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay410067P Basic course in education (OPEN UNI) 4.0 op

ECTS Credits:

4 credits

Language of instruction:

Finnish or English

Timing:

1st year

Secondary teacher students 3rd year spring term

Learning outcomes:

After completion of the course, the student

- identifies the most important features of education as a science
- has a basic understanding of the history of education and its main areas of study
- knows how to use the basic concepts of education and pedagogy and is familiar with issues connected with them
- can relate different sectors of the educational sciences to each other
- is familiar with practical and professional tasks in the field of education and with issues connected to them.

Contents:

- basic concepts: development, bildung, teaching, pedagogical activity
- the status of scientific and practical theory in education and pedagogy
- education as a science, main areas and subareas
- history and development of education
- basics of professional growth and development
- orientation to practical tasks in education, assumption of a professional identity as a teacher and in other educational tasks.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures and other contact teaching 18 h, independent work 89 h

Target group:

Students in all programmes pursuing Basic Studies in Education

Prerequisites and co-requisites:

None

Recommended optional programme components:

This is the first course in the Basic Studies in Education (25 credits).

Recommended or required reading:

Rinne, R., Kivirauma, J. & Lehtinen, E. (eds.) (2000) Johdatus kasvatustieteisiin.

Siljander, P. (2002) Systemaattinen johdatus kasvatustieteeseen.

Availability can be checked [here](#).

Assessment methods and criteria:

Exam or written assignments

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

Grading:

pass/fail

Person responsible:

Pauli Siljander

Working life cooperation:

None

050081A: Basic teaching practice, 5 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Intermediate Studies

Laji: Practical training

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

5 cr

Language of instruction:

Finnish

Timing:

3rd year, spring term

Learning outcomes:

- The student identifies that the operation of a school is governed by laws and other standards such as curricula.
- The student is familiarised with the teacher's job and school as a work community.
- The student internalises the wide scope of a teacher's work and working as a guide of learning.
- The student is conscious of the meaning of the curriculum as the basis of teaching in his or her subject and knows how to apply it to his or her teaching.
- The student knows how to plan, implement and evaluate teaching.
- The student applies his/her skills to encounter different learners and to keep in control of teaching situations.

Contents:

- observation and analysis of teaching
- awareness of pupil needs and observation of the working atmosphere
- school laws and the core curriculum
- familiarisation with the teaching plans of the Teacher Training School and the student's own subject
- familiarisation with the practice plan and assessment criteria
- setting personal goals for teaching practice
- planning, implementation and evaluation of teaching
- teaching methods and materials
- development of skills of interaction
- special characteristics of the student's own subject
- individual and group supervision
- educational use of ICT

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Contact teaching 70-75 h, independent work 59-64 h

Target group:

Pedagogical Studies for Secondary Teachers

Prerequisites and co-requisites:

No

Recommended optional programme components:

Pedagogical Studies for Secondary Teachers

Recommended or required reading:

Depends on subject in which the student is practising

Assessment methods and criteria:

Presence teaching, independent work

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

Grading:

Pass/fail

Person responsible:

Oulu Teacher Training School

Working life cooperation:

Yes

410068P: Didactics, 4 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay410068P Didactics: (OPEN UNI) 4.0 op

ECTS Credits:

4 credits

Language of instruction:

Finnish or English

Timing:

1st year

Secondary teacher students 3rd year spring term

Learning outcomes:

After completion the students

- understand the basic concepts related to learning and teaching, their theoretical foundations and significance in practice
- understand the learning process and its cognitive, motivational and social features.
- recognize the teacher's role as a director/guider of learning and are familiar with new models of teaching
- are able to analyse the characteristics of a good learner in theory and practice and are aware of how learning skills can be taught.

Contents:

- basic concepts of learning and teaching, their theoretical foundations and significance in practice
- basic processes of learning, their cognitive, motivational and social features
- theoretical foundations of learning guidance: the teacher's role as a director of learning, models of teaching
- principles of curriculum design and planning of teaching entities
- the characteristics of a good learner in theory and in practice: how learning skills can be taught

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures and other contact teaching 18 h, independent studies 89 h

Target group:

Students in all programmes pursuing Basic Studies in Education

Prerequisites and co-requisites:

No

Recommended optional programme components:

The course is part of the Basic Studies in Education (25 cr).

Recommended or required reading:

Applicable parts:

- Hakkarainen, K. , Lonka, K. & Lipponen, L. (2004 or 2001) Tutkiva oppiminen. järki, tunteet ja kulttuuri oppimisen sytyttäjinä.
- and supplementary literature to be announced during the course.

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

Assessment methods and criteria:

Exam or written assignments

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

Grading:

pass/fail

Person responsible:

Sanna Järvelä

Working life cooperation:

No

410069P: Educational psychology, 4 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay410069P Educational psychology: (OPEN UNI) 4.0 op

ECTS Credits:

4 credits

Language of instruction:

Finnish

Timing:

1st year

Secondary teacher students 3rd year spring term

Learning outcomes:

Having completed the course, the student

- knows how to use the central concepts and identifies the main research areas and topics in educational psychology
- knows how to analyse the special nature of knowledge on educational psychology and estimate the opportunities and limitations in the application of this knowledge to educational work

Contents:

- the relationship of educational psychology to psychology and other subareas of education
- research object and basic concepts: growth, development and learning
- professional practice in educational psychology and its application to issues of growth and development at different ages

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures and other teaching 18 h, independent studies 89 h

Target group:

Students in all programmes pursuing Basic Studies in Education

Prerequisites and co-requisites:

No

Recommended optional programme components:

The course is part of the Basic Studies in Education (25 cr).

Recommended or required reading:

Applicable parts:

- Lehtinen, E., Kuusinen, J. & Vauras, M. (2007) Kasvatuspsykologia
- Soini (2013) Johdatusta kasvatuspsykologian kysymyksiin. Opintomoniste, available in Optima.
- and additional literature to be announced during the course.

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

Assessment methods and criteria:

Exam or written assignments

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

Grading:

pass/fail

Person responsible:

Hannu Soini

Working life cooperation:

No

Other information:

In early childhood education, this course is 2 cr in scope (lectures only).

050091A: Optional studies, 3 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

3 cr

Language of instruction:

Finnish

Timing:

3. opintovuosi, kevätlukukausi

Learning outcomes:

Having completed the course, the student is able to describe the main contents of the course selected by him/her and apply it in his/her work as a teacher.

Contents:

Permanent and annually alternating courses that support the general goals of the pedagogical studies for teachers, offered by the Teacher Training School, Education and Subject Didactics. The aim is to arrange courses on the following fields, among others: ICT, ethics, problem-based orientation in teaching and as part of the professional identity, civics and active citizenship, environmental responsibility, multi- and interculturalism, encountering dissimilarity, multiprofessional collaboration, functional mathematics etc.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures, other contact teaching and independent work totalling 27-80 h

Target group:

Secondary teacher students

Prerequisites and co-requisites:

No

Recommended optional programme components:

Course is part of the Pedagogical Studies for Secondary Teachers

Recommended or required reading:

Varies depending on the student's choice.

Assessment methods and criteria:

To be agreed on at the start of the course.

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

Grading:

Pass/fail

Person responsible:

Emilia Manninen

Working life cooperation:

No

410083P: Pedagogical seminar, 3 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

3 cr

Language of instruction:

Finnish

Timing:

3rd year, spring term

Learning outcomes:

The student

- constructs a relationship between general education studies and other contents of pedagogical studies and experiences gained in teaching practice (relationship between theory and practice)
- knows how to carry on a pedagogical discussion with the representatives of different subjects and other parties, reflecting on his or her own pedagogical theory-in-use and justifying his/her pedagogical activities
- knows how to encounter different pupils, identify the need for general, enhanced and special support and utilise in his/her work skills of pupil welfare work based on the main principles of inclusive education and the multiprofessional network as an educational and pedagogical resource
- knows the principles of pupil welfare work and the pupil welfare group and is able to make use of them to compose an individual education plan (IEP), for instance

Contents:

- orientation to educational science and its various areas and their meaning as part of a secondary teacher's professional competence
- educational thinking and pedagogical theory-in-use as part of a secondary teacher's professional competence
- orientation to issues related to facing dissimilarity at school as part of a secondary teacher's professional competence

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 8 h, small group sessions 20 h, independent work 22 h

Target group:

Secondary teacher students doing their Bachelor studies

Prerequisites and co-requisites:

None

Recommended optional programme components:

410067P Basic Course in Education

410069P Educational Psychology

410068P Didactics, Subject Didactics I

050081A Basic Practice

Recommended or required reading:

To be agreed on at the start of the course.

Assessment methods and criteria:

Active participation in teaching and practical assignments, written seminar paper

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

Grading:

Pass/fail

Person responsible:

Marko Kielinen and Markku Salakka

Working life cooperation:

None

050114A: Subject didactics I/Mathematics and natural sciences, 3 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

3 cr

Language of instruction:

Finnish

Timing:

3rd year, spring term

Learning outcomes:

The student:

- knows how to describe different approaches and teaching methods in mathematics education.
- knows how to use some mathematics learning aids and justify the use of learning aids in mathematics education.
- knows how to describe assessment of teaching and learning in mathematics and science.
- knows how to identify and analyse learning difficulties.
- knows how to evaluate preconceptions and their meaning in physics and chemistry teaching.

Contents:

- Nature of mathematics and science knowledge and its significance in the teaching and learning of the subjects
- Different approaches to and teaching methods in mathematics and science education
- Learning aids and difficulties in mathematics
- Assessment in mathematics and science education
- Meaning of preconceptions in physics and chemistry education
- Current themes in cooperation with the Oulu LUMA (Science and Mathematics) Centre

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 4 h, exercises 30 h (student chooses two exercise groups from among mathematics, physics and chemistry based on his or her preferences). Independent work 46 h.

Target group:

Secondary teacher students doing Bachelor studies

Prerequisites and co-requisites:

No

Recommended optional programme components:

Subject Didactics II, Subject Didactics III, Mathematical Subjects

Recommended or required reading:

Agreement on learning materials is made at the start of the course

Assessment methods and criteria:

Participation in exercise groups, group examination

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

Grading:

Pass/fail

Person responsible:

Vesa-Matti Sarenus, Emilia Manninen and Kaisa Hautala

Working life cooperation:

No

050214A: Subject didactics II/Mathematics and natural sciences, 3 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

3 cr

Language of instruction:

Finnish

Timing:

3rd year, spring term

Learning outcomes:

The student

- knows how to apply the content knowledge of subject didactics and specific to the subject needed in the teaching of mathematics and science contents in primary and secondary education.
- knows how to evaluate differentiation and integration of teaching and how to introduce various differentiation and integration methods.
- knows how to analyse stages of transition from one school level to another especially from the viewpoint of mathematics and science.
- knows how to choose and justify the use of various teaching methods in mathematics and science education.

Contents:

- Differentiation and integration in mathematics and science education
- Transition from one school level to another from the viewpoint of mathematics and science
- Examples of teaching and learning contents in mathematics and science

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 4 h, exercises 30 h (student selects two exercise groups from among mathematics, physics and chemistry based on his/her preferences). Independent work 46 h.

Target group:

Secondary teacher students doing Bachelor studies

Prerequisites and co-requisites:

050114A Subject Didactics I/Mathematics and Science

Recommended optional programme components:

Subject Didactics I, Subject Didactics III, Mathematical Subjects

Recommended or required reading:

Agreement on learning materials is made at the start of the course.

Assessment methods and criteria:

Participation in exercise groups, group exam

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

Grading:

Pass/fail

Person responsible:

Vesa-Matti Sarenus, Emilia Manninen and Kaisa Hautala

Working life cooperation:

No

050314A: Subject didactics III/Mathematics and natural sciences, 1 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

1 cr

Language of instruction:

Finnish

Timing:

3rd year, spring term

Learning outcomes:

The student

- is able to plan mathematics and science teaching and assess learning based on the curriculum
- knows how to explicate various working methods and learning materials used in the teaching of mathematics and science

- knows how to use information and communication technology in the teaching of mathematics and science

Contents:

- construction of various lesson plans based on the curricula
- formulation and assessment of tests
- familiarisation with learning materials and working methods
- educational use of ICT

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures and exercises 10 h, independent work 17 h

Target group:

Secondary teacher students doing Bachelor studies

Prerequisites and co-requisites:

Subject Didactics I and II/Mathematics and Science

Recommended optional programme components:

Subject Didactics I, Subject Didactics II, Mathematical Subjects

Recommended or required reading:

Learning materials to be agreed on at the start of the course

Assessment methods and criteria:

Exercises

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

Grading:

Pass/fail

Person responsible:

Vesa-Matti Sarenus, Emilia Manninen, Kaisa Hautala, Pekka Vaaraniemi and Katja Leinonen

Working life cooperation:

No

780681S: Chemical Legislation in Finland, 1 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Mika Virtanen

Opintokohteen kielet: Finnish

Leikkaavuudet:

780321A Chemical Legislation in Finland 1.0 op

ECTS Credits:

1 credit/27 hours of work

Language of instruction:

Finnish

Timing:

4th spring

Learning outcomes:

After completion of the course students have a basic understanding of Finnish legislation concerning chemistry and occupational health. He/she is acquainted with the limitations of the use of dangerous chemicals and is able to find updated information of them. After completion of the course students should also have a basic understanding of the main laws of pressure containers and tanks of compressed gases as well as of radiation.

Contents:

Safety at work, sanitarily and environmentally hazardous chemicals, explosive materials and combustible liquids, pressure containers and tanks of compressed gases.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

6 hours of work, 21 hours of self-study

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

No specific prerequisites

Recommended optional programme components:

The contents and credits of this course are the same as in the course 780681S Chemical Legislation in Finland. The student can perform the course only once: 780321A or 780681S.

Recommended or required reading:

Työpaikan lakikirja. Työpaikan kemikaalilainsäädäntö.

Assessment methods and criteria:

Final examination

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

Grading:

The course utilizes verbal grading scale pass/fail.

Person responsible:

Laboratory Manager, PhD. Mika Virtanen

Working life cooperation:

No

Other information:

Compulsory in the B.Sc. Degree, if the student has started his/her studies before 1st August 2012.

780699S: Maturity Test, 0 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department 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, Swedish or English

Timing:

5th year

Learning outcomes:

Upon completion 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 abstract 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:

Professors, Docents, Lectures, Doctor level researchers of the Chemistry Department

Working life cooperation:

No

Other information:

No

781600S: Final Examination in Inorganic Chemistry, 7 op**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Department of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**ECTS Credits:**

7 credits/187 hours of work

Language of instruction:

Finnish, English on demand

Timing:

5th spring

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:

Chemistry, 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:

Inorganic Chemistry: Housecroft, C. E. and Sharpe, A. G. Inorganic Chemistry, 4. painos, Pearson Education, 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:

Professors

Working life cooperation:

No

Other information:

No

781602S: Master's Thesis in Inorganic Chemistry, 20 op**Opiskelumuoto:** Advanced Studies**Laji:** Diploma thesis**Vastuuyksikkö:** Department 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

Learning outcomes:

After finishing the Master's Thesis the student has got practice for the scientific reasoning and communication, information retrieval and its critical evaluation.

Contents:

The student is required to write a survey of literature on a topic which will be decided together with the student's advisor. The Master's Thesis can be, but does not necessarily have to be, on the same topic as the Research project. The length of the survey should be about 40-60 pages with approximately 50 references.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

534 hours of literature research

Target group:

Chemistry, Chemistry teachers, compulsory

Prerequisites and co-requisites:

The Master's Thesis can be started when all studies for the B.Sc. Degree have been completed.

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:

Instructions given by the supervisor

Assessment methods and criteria:

534 hours of independent literature research.

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:

Professors, Docents, Lectures, Doctor level researchers of the Chemistry Department

Working life cooperation:

No

Other information:

For the Maturity test is accepted the abstract of the thesis.

782600S: Final Examination in Physical Chemistry, 7 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen oppimateriaali:

Clayden, J., Greeves, N., Warren, S. ja Wothers, P., , 2001

Cotton, F. Albert , , 1995

Opintokohteen kielet: Finnish

ECTS Credits:

7 credits/187 hours of work

Language of instruction:

Finnish, English on demand

Timing:

5th spring

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:

Chemistry, 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:

Atkins, P. and De Paula, J., Atkins' Physical Chemistry, Oxford University Press, Oxford, 9th ed. (2009), or newer ed.

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:

Professors

Working life cooperation:

No

Other information:

No

782602S: Master's Thesis in Physical Chemistry, 20 op**Opiskelumuoto:** Advanced Studies**Laji:** Diploma thesis**Vastuuyksikkö:** Department 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

Learning outcomes:

After finishing the Literature Survey the student has got practice for the scientific reasoning and communication, information retrieval and its critical evaluation.

Contents:

The student is required to write a survey of literature on a topic which will be decided together with the student's advisor. The length of the survey should be about 40-60 pages with approximately 50 references.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

534 hours of work

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

The Master's Thesis can be started when all studies for the B.Sc. Degree have been completed.

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:

Instructions given by the supervisor

Assessment methods and criteria:

534 hours of work

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:

Professors, Docents, Lectures, Doctor level researchers of the Chemistry Department

Working life cooperation:

No

Other information:

For the Maturity Test is accepted the abstract on the thesis.

783600S: Final Examination in Organic Chemistry, 7 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen oppimateriaali:

Clayden, J., Greeves, N., Warren, S. ja Wothers, P., , 2001

Cotton, F. Albert , , 1995

Opintokohteen kielet: Finnish

ECTS Credits:

7 credits/187 hours of work

Language of instruction:

Finnish, English on demand

Timing:

5th spring

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-toface teaching

Learning activities and teaching methods:

187 hours of self-study

Target group:

Chemistry, 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:

Organic Chemistry: Clayden, J., Greeves, N., Warren, S. and Wothers, P.: Organic Chemistry, Oxford University Press, 2001 and one book by separate agreement.

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:

Professors

Working life cooperation:

No

Other information:

No

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

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Department 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

Learning outcomes:

After finishing the Thesis the student has got practice for the scientific reasoning and communication, information retrieval and its critical evaluation.

Contents:

The student is required to write a survey of literature on a topic which will be decided together with the student's advisor. The length of the survey should be about 40-60 pages with approximately 50 references.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

534 hours of work

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

The Master's Thesis can be started when all studies for the B.Sc. Degree have been completed.

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:

Instructions given by the supervisor

Assessment methods and criteria:

534 hours of work

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

Person responsible:

Professors, Docents, Lectures, Doctor level researchers of the Chemistry Department

Working life cooperation:

No

Other information:

For the Maturity test is accepted the abstract of the thesis.

784600S: Final Examination in Structural Chemistry, 7 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen oppimateriaali:

Clayden, J., Greeves, N., Warren, S. ja Wothers, P., , 2001

Cotton, F. Albert , , 1995

Opintokohteen kielet: Finnish

ECTS Credits:

7 credits/187 hours of work

Language of instruction:

Finnish, English on demand

Timing:

5th spring

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:

Chemistry, 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:

By separate agreement

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:

Doc. Sampo Mattila

Working life cooperation:

No

Other information:

No

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

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Department 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

Learning outcomes:

After finishing the Literature Survey the student has got practice for the scientific reasoning and communication, information retrieval and its critical evaluation.

Contents:

The student is required to write a survey of literature on a topic which will be decided together with the student's advisor. The length of the survey should be about 40-60 pages with approximately 50 references.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

534 hours of work

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

The Master's Thesis can be started when all studies for the B.Sc. Degree have been completed.

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:

Instructions given by the supervisor

Assessment methods and criteria:

534 hours of work

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:

Professors, Docents, Lectures, Doctor level researchers of the Chemistry Department

Working life cooperation:

No

Other information:

For the Maturity Test is accepted the abstract of the thesis.

050082A: Advanced teaching practice I, 6 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Intermediate Studies

Laji: Practical training

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

6 cr

Language of instruction:

Finnish

Timing:

4th year autumn

Learning outcomes:

The student

- takes into account the meaning of the teacher's responsibility and is capable of assuming autonomous responsibility for his/her work as a teacher
- fully understands the meaning of cooperation between home and school
- is capable of using the knowledge and skills that s/he has learnt previously and of working independently with pupils
- knows how to apply his/her what s/he knows about assessment
- knows how to plan for and carry out assessment of studies

Contents:

The following things are done in this course:

- close specification of student's goals in teaching practice
- goal-oriented planning, implementation and evaluation of lessons
- observation and analysis of teaching
- special traits of the student's own subject (curriculum of the subject and the entire curriculum)
- information and communication technology in teaching from the viewpoint of the student's subject
- familiarisation with supervision duties
- collaboration between home and school
- individual and group guidance and autonomous study

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Contact teaching 56-66 h, independent work 94-104 h

Target group:

Secondary teacher students doing their Master's studies

Prerequisites and co-requisites:

None

Recommended optional programme components:

Pedagogical Studies for Teachers, Basic Practice

Recommended or required reading:

Depends on the subject in which student is practising

Assessment methods and criteria:

Attendance in teaching and independent work.

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

Grading:

Pass/fail

Person responsible:

Oulu Teacher Training School

Working life cooperation:

Yes. Teaching practice.

050083A: Advanced teaching practice II, 6 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Intermediate Studies

Laji: Practical training

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

6 cr

Language of instruction:

Finnish

Timing:

4th year autumn

Learning outcomes:

The student

- knows how to apply the knowledge that s/he has learnt and is capable of assuming autonomous and active responsibility for work as a teacher
- knows how to take into account the meaning of multiprofessional collaboration in working as a teacher
- fully understands the significance of pupil welfare in a teacher's work
- knows how to analyse and apply the knowledge and skills acquired in previous studies to work actively with pupils and students
- is capable of analysing the meaning of assessment in the work of a teacher and of applying this knowledge to the planning and implementation of study assessment

Contents:

The course involves the following things:

- autonomous, goal-oriented planning, implementation and evaluation of a large-scale teaching module either alone or in pairs
- assuming responsibility for all the aspects of a teacher's work
- deepening the picture of a teacher's work
- diversified and varied working methods: production of learning materials and using them in the lessons, mastery of basic skills in the use of interactive whiteboards, utilisation of software related to the teaching of the student's subject, the use of various learning environments and electronic learning materials in teaching

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Contact teaching 56-66 h, independent work 94-104 h

Target group:

Secondary teacher students doing their Master's studies

Prerequisites and co-requisites:

None

Recommended optional programme components:

Pedagogical Studies for Subject Teachers, Advanced Practice I

Recommended or required reading:

Depends on the subjects in which the student is practising.

Assessment methods and criteria:

Presence teaching and independent work

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

Grading:

Pass/fail

Person responsible:

Oulu Teacher Training School

Working life cooperation:

Yes. Teaching practice.

416004A: Basics of educational administration, 2 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

1 - 2 ECTS cr

Language of instruction:

Finnish

Timing:

4.-5. year

Learning outcomes:

Upon completion of the study module, the students

- know the laws and statutes governing educational administration as well as their contents
- know how to apply educational administration legislation into practice at their own level of education
- know how to use the Finlex software

Contents:

The course aims to give the students the necessary legal proficiency for work as a public servant or in school administration. In addition, the students will gain an understanding of their own rights and obligations and learn how to recognize situations when further information and/or help is necessary. During the course, the students will be introduced with the administration system and public services in terms of set duties and opportunities as defined in legal regulations and norms.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures and exam 16 h, post-exam small group work and practice assignment 4 h.

Secondary teacher students: Lectures 10 h ja independent work max. 17 h.

Target group:

Students pursuing Pedagogical Studies

Prerequisites and co-requisites:

No

Recommended optional programme components:

Pedagogical studies for teachers

Recommended or required reading:

TBC at the beginning of the course

Assessment methods and criteria:

Exam, assignment

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

Grading:

pass/fail

Person responsible:

N.N.

Working life cooperation:

No

410071P: Educational philosophy, 4 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay410071P Educational philosophy: (OPEN UNI) 4.0 op

ECTS Credits:

4 credits

Language of instruction:

Finnish or English

Learning outcomes:

The students are familiar with the main areas of educational philosophy and how they give rise to educational problematisation and question formulation as well as research and results. The students know how to analyse and solve ethical and philosophical problems in education and teaching and are able to critically assess previously suggested solutions.

Contents:

- Educational philosophy as an area of educational sciences

- the nature of philosophy as a science, philosophical questions and the most important sub-areas.
- Objectives in education
- Historically important trends in academic study of educational philosophy
- Ethical nature of education, training and teaching, and ethical issues in pedagogical activity

Mode of delivery:

Lectures and other face-to-face teaching 18 h, independent work 89 h

Learning activities and teaching methods:

Lectures and other teaching 18 h and independent studies.

Target group:

Students in all programmes pursuing Basic Studies in Education (25 credits).

Prerequisites and co-requisites:

No

Recommended optional programme components:

The course is part of the Basic Studies in Education (25 cr).

Recommended or required reading:

Applicable parts:

- Atjonen, P. (2004) Pedagoginen etiikka koulukasvatuksen karttana ja kompassina.
- Ojakangas, M. (2001) Pietas - Kasvatuksen mahdollisuus.
- Puolimatka, T. (1995) Kasvatus ja filosofia. (Primary reading)
- Etiikka koulun arjessa. (2002)

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

Assessment methods and criteria:

Exam or written assignments.

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

Grading:

pass/fail

Person responsible:

Eetu Pikkarainen

Working life cooperation:

No

050410A: Research in subject didactics, 8 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

8 cr

Language of instruction:

Finnish

Timing:

4th year, autumn term

Learning outcomes:

The student knows

- how to describe the basis of pedagogical research and explain the basics of qualitative and quantitative research
- how to make use of didactic research in his/her own subject and how to compose a thesis on subject didactics
- how to choose a relevant research method for his/her study and how to analyse the research data
- how to evaluate the significance of research in subject didactics for the teaching of his/her own subject and how to construct the thinking of an inquiring teacher

Contents:

Planning, implementing and publishing a study on subject didactics. The study can be

- a teaching experiment
- a curriculum study
- a study on content knowledge in a subject

- a study of learning materials
- a study of learning environments and the instructional use of new technologies
- a study on attitudes
- a study on the leisure activities connected with a subject
- a study of assessment methods used in a subject

The study can focus on primary, secondary or tertiary education. It may also be focused on the third sector.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

- Lectures 6 h
- Methodological exercises 6 h
- Guidance 2 h
- Seminar work 36 h, including the presentation of the student's own study and acting as opponent to a peer's study
- Independent work 166 h, including the writing of a seminar thesis, preparation for opposing a peer's study, and familiarisation with other theses

Target group:

Secondary teacher students

Prerequisites and co-requisites:

Subject Didactics I, Subject Didactics II, Subject Didactics III

Recommended optional programme components:

Course is part of the Pedagogical Studies for Secondary Teachers

Recommended or required reading:

To be agreed on as the course proceeds.

Assessment methods and criteria:

Participation in contact teaching, writing and opposing a seminar thesis
Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

Pass/fail

Person responsible:

Jouni Peltonen, lecturers in subject didactics

Working life cooperation:

No

410070P: Sociology of education, 4 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay410070P Sociology of education:Society, educational institutions and social interaction (OPEN UNI) 4.0
op

ECTS Credits:

4 credits

Language of instruction:

Finnish or English

Timing:

1st year

Secondary teacher students 4th year autumn term

Learning outcomes:

After completion the student will be able to visualize:

- the links between educational sociology, sociology and education.
- basic issues and concepts in social sciences and educational sociology
- the Finnish education system and educational politics as a part of social politics

Contents:

- central concepts in social sciences
- basic concepts and issues in educational sociology

- sociology of education: links to education and sociology
- the roles of socialization and education
- classic trends in the educational sociology: structuralism, conflict-theory and critical sociology, and socialization theory and interaction
- the Finnish education system: past, present and future
- education politics as a part of social politics
- theoretical and practical issues in educational sociology: school practices (interaction-based school class research), hidden curriculum, equality of education, identity, normality and deviation.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures and other teaching 18 h, independent study 89 h.

Target group:

Students in all programmes pursuing Basic Studies in Education.

Prerequisites and co-requisites:

No

Recommended optional programme components:

The course is part of the Basic Studies in Education (25 cr).

Recommended or required reading:

Aittola, T. (toim.) 2012. Kasvatussosiologian suunnannäyttäjiä.

[OR Aittola, T. (toim.) (1999) Kasvatussosiologian teoreetikoita. Uudesta kasvatussosiologiasta oppimisen kriittiseen tarkasteluun.]

Antikainen, A., Rinne, R. & Koski, L. (2000) Kasvatussosiologia.

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

Assessment methods and criteria:

Exam or written assignments.

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

Grading:

pass/fail

Person responsible:

Veli-Matti Ulvinen

Working life cooperation:

No

050085A: Special education, 1 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Faculty of Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

1 cr

Language of instruction:

Finnish

Timing:

4th year, autumn

Learning outcomes:

- The student is acquainted with the individual education plan (IEP)
- The student makes plans for a pupil's personal evaluation and teaching according to the pupil's learning abilities
- The student is familiarised with literature on special education and facing the pupil.

Contents:

- Ideologies, values and principles guiding special education
- General, special and reinforced support - care, teaching and rehabilitation
- Cooperation, multiprofessionalism and educational partnership
- Familiarisation with the field, target groups and practices of special education
- Responding to the need for special support through pedagogical means
- Pupil welfare work in schools

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 10 h, visit and independent work

Target group:

Secondary teacher students doing their Master's studies

Prerequisites and co-requisites:

None

Recommended optional programme components:

Pedagogical Studies for Subject Teachers

Recommended or required reading:

To be agreed on at the start of the course.

Assessment methods and criteria:

Participation in face-to-face teaching, visit and report, familiarisation with literature

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

Grading:

Pass/fail

Person responsible:

Marko Kielinen

Working life cooperation:

None

780681S: Chemical Legislation in Finland, 1 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Mika Virtanen

Opintokohteen kielet: Finnish

Leikkaavuudet:

780321A Chemical Legislation in Finland 1.0 op

ECTS Credits:

1 credit/27 hours of work

Language of instruction:

Finnish

Timing:

4th spring

Learning outcomes:

After completion of the course students have a basic understanding of Finnish legislation concerning chemistry and occupational health. He/she is acquainted with the limitations of the use of dangerous chemicals and is able to find updated information of them. After completion of the course students should also have a basic understanding of the main laws of pressure containers and tanks of compressed gases as well as of radiation.

Contents:

Safety at work, sanitarily and environmentally hazardous chemicals, explosive materials and combustible liquids, pressure containers and tanks of compressed gases.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

6 hours of work, 21 hours of self-study

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

No specific prerequisites

Recommended optional programme components:

The contents and credits of this course are the same as in the course 780681S Chemical Legislation in Finland. The student can perform the course only once: 780321A or 780681S.

Recommended or required reading:

Työpaikan lakikirja. Työpaikan kemikaalilainsäädäntö.

Assessment methods and criteria:

Final examination

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

Grading:

The course utilizes verbal grading scale pass/fail.

Person responsible:

Laboratory Manager, PhD. Mika Virtanen

Working life cooperation:

No

Other information:

Compulsory in the B.Sc. Degree, if the student has started his/her studies before 1st August 2012.

780699S: Maturity Test, 0 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department 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, Swedish or English

Timing:

5th year

Learning outcomes:

Upon completion 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 abstract 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:

Professors, Docents, Lectures, Doctor level researchers of the Chemistry Department

Working life cooperation:

No

Other information:

No

780601S: Project work, 12 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

10 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 laboratory work

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

B.Sc. studies in chemistry including the course Research Training (780301A) completed

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:

200 hours of laboratory work

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 and Doctor level Researchers of the Chemistry Department.

Working life cooperation:

No

Other information:

The Project work including the report is to be done within six months from starting the work

780690S: Seminar, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department 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:

Improving oral/aural skills connected to the student's academic field as well as in everyday conversational situations.

Contents:

The student gives two presentations (20 min/each) on given scientific subjects related to the pro gradu (M.Sc.) thesis or/and the Research Project and distributes an abstract to the audience.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Students register for the course in the beginning 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:

Compulsory attendance in the seminar and approved own seminar talks.

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 and Lecturer Minna Tiainen

Working life cooperation:

No

Other information:

Enrolment for the course is done through WebOod.

781600S: Final Examination in Inorganic Chemistry, 7 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

7 credits/187 hours of work

Language of instruction:

Finnish, English on demand

Timing:

5th spring

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:

Chemistry, 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:

Inorganic Chemistry: Housecroft, C. E. and Sharpe, A. G. Inorganic Chemistry, 4. painos, Pearson Education, 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:

Professors

Working life cooperation:

No

Other information:

No

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

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Department 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

Learning outcomes:

After finishing the Master's Thesis the student has got practice for the scientific reasoning and communication, information retrieval and its critical evaluation.

Contents:

The student is required to write a survey of literature on a topic which will be decided together with the student's advisor. The Master's Thesis can be, but does not necessarily have to be, on the same topic as the Research project. The length of the survey should be about 40-60 pages with approximately 50 references.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

534 hours of literature research

Target group:

Chemistry, Chemistry teachers, compulsory

Prerequisites and co-requisites:

The Master's Thesis can be started when all studies for the B.Sc. Degree have been completed.

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:

Instructions given by the supervisor

Assessment methods and criteria:

534 hours of independent literature research.

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:

Professors, Docents, Lectures, Doctor level researchers of the Chemistry Department

Working life cooperation:

No

Other information:

For the Maturity test is accepted the abstract of the thesis.

781607S: Research Project in Inorganic Chemistry, 30 op

Voimassaolo: 01.08.2013 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department 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)

Learning outcomes:

After finishing the Research Project the student has got practice for the scientific reasoning and communication, information retrieval and its critical evaluation. The student can use research methods typical for his/her field and is familiar with the theoretical subject matter of his/her field.

Contents:

The Theses for the degree of M.Sc. consists of two parts: a research project with a written report and survey of literature. The completion of the laboratory work and the research report is expected to take approximately four months of full-time work. Together, they are worth 30 ECTS credits. In addition, the student is required to write a survey of literature (Master's Thesis) on a topic which will be decided together with the student's advisor. The survey can be, but does not necessarily have to be, on the same topic as the research project. The length of the survey should be about 40-60 pages with approximately 50 references. It is worth 20 ECTS credits. The completion of the whole thesis (50 ECTS credits altogether) requires about six months of full-time work.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

801 hours of laboratory work including the written report

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

The Research Project can be started when all studies for the B.Sc. Degree and the Project Work have been completed.

Recommended optional programme components:

Master's Thesis can be on the same topic as the Research Project.

Recommended or required reading:

Material given by the supervisor

Assessment methods and criteria:

The written report of the results of the Research project with the laboratory notebook is given to the supervisor. The instructions for reporting the research project and the standards for evaluation are found on the website of the Department of Chemistry.

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:

Professors, Docents, Lectures, Doctor level researchers of the Chemistry Department

Working life cooperation:

No

Other information:

No

782600S: Final Examination in Physical Chemistry, 7 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen oppimateriaali:

Clayden, J., Greeves, N., Warren, S. ja Wothers, P., , 2001

Cotton, F. Albert , , 1995

Opintokohteen kielet: Finnish

ECTS Credits:

7 credits/187 hours of work

Language of instruction:

Finnish, English on demand

Timing:

5th spring

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:

Chemistry, 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:

Atkins, P. and De Paula, J., Atkins' Physical Chemistry, Oxford University Press, Oxford, 9th ed. (2009), or newer ed.

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:

Professors

Working life cooperation:

No

Other information:

No

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

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Department 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

Learning outcomes:

After finishing the Literature Survey the student has got practice for the scientific reasoning and communication, information retrieval and its critical evaluation.

Contents:

The student is required to write a survey of literature on a topic which will be decided together with the student's advisor. The length of the survey should be about 40-60 pages with approximately 50 references.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

534 hours of work

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

The Master's Thesis can be started when all studies for the B.Sc. Degree have been completed.

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:

Instructions given by the supervisor

Assessment methods and criteria:

534 hours of work

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:

Professors, Docents, Lectures, Doctor level researchers of the Chemistry Department

Working life cooperation:

No

Other information:

For the Maturity Test is accepted the abstarct on the thesis.

782607S: Research Project in Physical Chemistry, 30 op

Voimassaolo: 01.08.2013 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department 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

Learning outcomes:

After finishing the Research Projec the student has got practice for the scientific reasoning and communication, information retrieval and its critical evaluation. The student can use research methods typical for his/her field and is familiar with the theoretical subject matter of his/her field.

Contents:

The Theses for the degree of M.Sc. consists of two parts: a research project with a written report and survey of literature. The completion of the laboratory work and the research report is expected to take approximately four months of full-time work. Together, they are worth 30 ECTS credits. In addition, the student is required to write a survey of literature (Master's Thesis) on a topic which will be decided together with the student's advisor. The survey can be, but does not necessarily have to be, on the same topic as the research project. The length of the survey should be about 40-60 pages with approximately 50 references. It is worth 20 ECTS credits. The completion of the whole thesis (50 ECTS credits altogether) requires about six months of full-time work.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

801 hours of laboratory work + report

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

The Research Project can be started when all studies for the B.Sc. Degree and the Project Work have been completed.

Recommended optional programme components:

Master's Thesis can be on the same topic as the research project.

Recommended or required reading:

Material given by the supervisor

Assessment methods and criteria:

The written report of the results of the Research project with the laboratory notebook is given to the supervisor. The instructions for reporting the research project and the standards for evaluation are found on the website of the Department of Chemistry.

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:

Professors, Docents, Lectures, Doctor level researchers of the Chemistry Department

Working life cooperation:

No

Other information:

No

783600S: Final Examination in Organic Chemistry, 7 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen oppimateriaali:

Clayden, J., Greeves, N., Warren, S. ja Wothers, P., , 2001

Cotton, F. Albert , , 1995

Opintokohteen kielet: Finnish

ECTS Credits:

7 credits/187 hours of work

Language of instruction:

Finnish, English on demand

Timing:

5th spring

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-toface teaching

Learning activities and teaching methods:

187 hours of self-study

Target group:

Chemistry, 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:

Organic Chemistry: Clayden, J., Greeves, N., Warren, S. and Wothers, P.: Organic Chemistry, Oxford University Press, 2001 and one book by separate agreement.

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:

Professors

Working life cooperation:

No

Other information:

No

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

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Department 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

Learning outcomes:

After finishing the Thesis the student has got practice for the scientific reasoning and communication, information retrieval and its critical evaluation.

Contents:

The student is required to write a survey of literature on a topic which will be decided together with the student's advisor. The length of the survey should be about 40-60 pages with approximately 50 references.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

534 hours of work

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

The Master's Thesis can be started when all studies for the B.Sc. Degree have been completed.

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:

Instructions given by the supervisor

Assessment methods and criteria:

534 hours of work

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

Person responsible:

Professors, Docents, Lectures, Doctor level researchers of the Chemistry Department

Working life cooperation:

No

Other information:

For the Maturity test is accepted the abstract of the thesis.

783607S: Research Project in Organic Chemistry, 30 op

Voimassaolo: 01.08.2013 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department 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

Learning outcomes:

After finishing the Research Project the student has got practice for the scientific reasoning and communication, information retrieval and its critical evaluation. The student can use research methods typical for his/her field and is familiar with the theoretical subject matter of his/her field.

Contents:

The Theses for the degree of M.Sc. consists of two parts: a research project with a written report and survey of literature. The completion of the laboratory work and the research report is expected to take approximately four months of full-time work. Together, they are worth 30 ECTS credits. In addition, the student is required to write a survey of literature (78x602S Master's Thesis) on a topic which will be decided together with the student's advisor. The survey can be, but does not necessarily have to be, on the same topic as the research project. The length of the survey should be about 40-60 pages with approximately 50 references. It is worth 20 ECTS credits. The completion of the whole thesis (50 ECTS credits altogether) requires about six months of full-time work.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

801 hours of laboratory work including the written report

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

The Research Project can be started when all studies for the B.Sc. Degree and the Project Work have been completed.

Recommended optional programme components:

Master's Thesis can be on the same topic as the Research Project.

Recommended or required reading:

Instructions given by the supervisor

Assessment methods and criteria:

The written report of the results of the Research project with the laboratory notebook is given to the supervisor. The instructions for reporting the research project and the standards for evaluation are found on the website of the Department of Chemistry.

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:

Professors, Docents, Lectures, Doctor level researchers of the Chemistry Department

Working life cooperation:

No

Other information:

No

784600S: Final Examination in Structural Chemistry, 7 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen oppimateriaali:

Clayden, J., Greeves, N., Warren, S. ja Wothers, P., , 2001

Cotton, F. Albert , , 1995

Opintokohteen kielet: Finnish

ECTS Credits:

7 credits/187 hours of work

Language of instruction:

Finnish, English on demand

Timing:

5th spring

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:

Chemistry, 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:

By separate agreement

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:

Doc. Sampo Mattila

Working life cooperation:

No

Other information:

No

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

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Department 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

Learning outcomes:

After finishing the Literature Survey the student has got practice for the scientific reasoning and communication, information retrieval and its critical evaluation.

Contents:

The student is required to write a survey of literature on a topic which will be decided together with the student's advisor. The length of the survey should be about 40-60 pages with approximately 50 references.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

534 hours of work

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

The Master's Thesis can be started when all studies for the B.Sc. Degree have been completed.

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:

Instructions given by the supervisor

Assessment methods and criteria:

534 hours of work

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:

Professors, Docents, Lectures, Doctor level researchers of the Chemistry Department

Working life cooperation:

No

Other information:

For the Maturity Test is accepted the abstract of the thesis.

784607S: Research Project in Structural Chemistry, 30 op

Voimassaolo: 01.08.2013 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department 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

Learning outcomes:

After finishing the Research Project the student has got practice for the scientific reasoning and communication, information retrieval and its critical evaluation. The student can use research methods typical for his/her field and is familiar with the theoretical subject matter of his/her field.

Contents:

The Theses for the degree of M.Sc. consists of two parts: a research project with a written report and survey of literature. The completion of the laboratory work and the research report is expected to take approximately four months of full-time work. Together, they are worth 30 ECTS credits. In addition, the student is required to write a survey of literature (78x602S Master's Thesis) on a topic which will be decided together with the student's advisor. The survey can be, but does not necessarily have to be, on the same topic as the research project. The length of the survey should be about 40-60 pages with approximately 50 references. It is worth 20 ECTS credits. The completion of the whole thesis (50 ECTS credits altogether) requires about six months of full-time work.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

801 hours of laboratory work including the written report

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

The Research Project can be started when all studies for the B.Sc. Degree and the Project Work have been completed.

Recommended optional programme components:

Master's Thesis can be on the same topic as the Research Project.

Recommended or required reading:

Material given by the supervisor

Assessment methods and criteria:

The written report of the results of the Research project with the laboratory notebook is given to the supervisor. The instructions for reporting the research project and the standards for evaluation are found on the website of the Department of Chemistry.

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:

Professors, Docents, Lectures, Doctor level researchers of the Chemistry Department

Working life cooperation:

No

Other information:

No

Tutkintorakenteisiin kuulumattomien opintokokonaisuuksien ja -jaksojen kuvaukset

300003Y: Activities in university and student organizations, 1 - 4 op

Voimassaolo: 01.01.2010 -

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Faculty of Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

Ei opintojaksokuvauksia.

783633S: Adhesion Chemistry, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Hormi Osmo

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits/80 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th or 5th year. The course is lectured every other year.

Learning outcomes:

After passing the course the student can explain the composition of an adhesive formulation and can also explain the basics of adhesion theory.

Contents:

Adhesion theory, surface treatment methods, thermoplastic block copolymers, polyurethanes, poly(vinyl acetate), acrylates, anaerobic adhesives, cyanoacrylates.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

24 hours of lectures, 56 hours of self study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Introduction to Polymer Chemistry (780326A/783650S) and Physical Chemistry of Surfaces I (782620S)

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:

Skeits, I.: Handbook of Adhesives, 3rd ed., Van Nostrand Reinhold, New York, 1990.

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. Osmo Hormi

Working life cooperation:

No

Other information:

No

300002M: Advanced Information Skills, 1 op

Voimassaolo: 01.08.2009 -

Opiskelumuoto: Other Studies

Laji: Course

Vastuuyksikkö: Faculty of Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Sassali, Jani Henrik

Opintokohteen kielet: Finnish

ECTS Credits:

1 ECTS credit

Language of instruction:

Finnish

Timing:

Intended for degree students working on their diploma/master's thesis. The course unit is held once in the autumn and once in the spring semester.

Learning outcomes:

Students know the different phases of scientific information retrieval process and basic techniques of systematic information search. They will find the most important reference databases of their discipline and know how to evaluate information sources and search results.

Contents:

Scientific information retrieval, evaluation of search results and information sources, information search on subject areas of diploma/master's thesis.

Mode of delivery:

Blended teaching: lectures, web-based learning material and exercises in Optima environment, personal guidance

Learning activities and teaching methods:

Lectures 6-12h, self-study 20h, personal guidance 1h

Target group:

The course is optional for students of the Faculty of Science and the Faculty of Technology.

Prerequisites and co-requisites:

No

Recommended optional programme components:

No

Recommended or required reading:

Parts from the following chapters of the Toolbox of Research:

<https://wiki oulu.fi/display/jotut/1.1+Tieteellinen+tiedonhankinta>

<https://wiki oulu.fi/display/jotut/1.3.1+Tieteellisiin+julkaisuihin+pohjautuva+arviointi>

Assessment methods and criteria:

Passing the course requires participation in the lectures (6h) and personal guidance and successful completion of the course assignments.

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

Grading:

pass/fail

Person responsible:

Science and Technology Library Tellus, tellustieto (at) oulu.fi

Working life cooperation:

No

781625S: Aquatic Chemistry, 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Leena Kaila

Opintokohteen kielet: Finnish

ECTS Credits:

4 credits /107 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th or 5th spring. The course is lectured every other year.

Learning outcomes:

After this course the student should understand chemistry of natural waters: chemical equilibrium and reaction rates in them. Models of natural waters, influences of pollution on them.

Contents:

Atmosphere-water-solid-interactions and regulation of the chemical composition of natural waters.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

32 hours of lectures, 75 hours self-study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Introduction to Analytical Chemistry (780111P)

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:

Stumm, W. and Morgan, J.J.: Aquatic Chemistry - Chemical Equilibria and Rates in Natural Waters, 3rd ed., John Wiley & Sons, New York, 1995, Chapters 1, 2.1-2, 3-10, 15; Recommended: Buffle, J.: Complexation Reactions In Aquatic Systems: An Analytical Approach, Ellis Horwood Limited, Chichester, 1988.

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:

Lecturer Leena Kaila

Working life cooperation:

No

Other information:

No

781637S: Atomic Spectrometric Methods, 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Paavo Perämäki

Opintokohteen kielet: Finnish

ECTS Credits:

4 credits /107 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 2014.

Learning outcomes:

Upon completion of the course, student should have acquired knowledge and understanding of modern AAS and ICP-OES techniques and their advantages and "weak points" in the point of view of elements and samples to be analyzed.

Contents:

Theoretical background of atomic absorption spectrometry and atomic emission spectrometry employing plasma sources, modern instrumentation and determination of various elements, interference effects and their correction, optimization of the determination procedures, instrument diagnostics.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

30 hours of lectures and project working + 77 hours of self-study incl. practical exercise

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Instrumental Analysis (780328A)

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:

Lajunen, L.H.J. and Perämäki, P.: Spectrochemical Analysis by Atomic Absorption and Emission, 2nd ed., The Royal Society of Chemistry, 2004

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

780109P: Basic Principles in Chemistry, 4 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Minna Tiainen

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
780101P	Introduction to Physical Chemistry	7.0 op
780101P2	Physical Chemistry I	4.0 op
780107P	Basic Course in Inorganic and Physical Chemistry	7.5 op
780152P	Inorganic and Physical Chemistry I	7.5 op
780153P	General and Inorganic Chemistry	7.5 op
780154P	Basic Inorganic Chemistry	7.5 op

ECTS Credits:

4 credits/107 hours of work

Language of instruction:

Finnish

Timing:

1st autumn

Learning outcomes:

Upon completion of the course, the student will be able to display an understanding of basic chemistry phenomenon; equilibrium of acids and bases, chemical equilibrium, redox reactions and stoichiometry.

Contents:

Introduction to chemistry, stoichiometry, redox reactions, chemical equilibrium, the equilibrium of acid and bases, buffer solutions, titration.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

36 hours of lectures/ self –study 71 hours

Target group:

Biology, Geology, Mechanical Engineering, Process Engineering, Environmental Engineering compulsory. Geography, optional.

Prerequisites and co-requisites:

No specific prerequisites

Recommended optional programme components:

This course has partly the same contents as the courses General and Inorganic Chemistry I and II (780114P and 780115P) or Introduction to Chemistry (780113P) (and the course Introduction to Physical Chemistry). If the student performs also the courses Inorganic Chemistry I and II (780114P and 780115P) or Introduction to Chemistry, this course will be cancelled in his/hers study register.

Recommended or required reading:

Petrucci, R.H., Harwood, W.S., and Herring, F.G.: General Chemistry: Principles and Modern Applications, Prentice Hall, 8th edition (2002) (Chapters 1-6, 10, 16-18) or a newer edition.

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:

Lecturer Minna Tiainen

Working life cooperation:

No

Other information:

This course is only for students who have chemistry as a minor subject.

784637S: Biological NMR Spectroscopy, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Mattila, Sampo Antero

Opintokohteen kielet: English

ECTS Credits:

3 credits/80 hours of work

Language of instruction:

English

Timing:

The course is lectured every year.

Learning outcomes:

After the course the students have basic knowledge and hands on experience with backbone assignment of small ^{15}N / ^{13}C labelled protein using most common 3 dimensional triple resonance NMR spectra.

Contents:

During the course the students get hands on experience on setting up and acquiring multi dimensional spectra as well as processing and converting data to other formats and assigning protein backbones.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

14 hours of lectures + applications, 30 hours of exercises, 36 hours of self-study

Target group:

Chemistry, optional

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:

Zerbe (ed): Bio-NMR in Drug Research, Wiley-VCH and Cavanagh: Protein NMR Spectroscopy, Academic Press, 1995 (partly) ISBN: 0121644901.

Assessment methods and criteria:

The seminar at the end of the course, exercises and home assignments

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

782621S: Catalysis, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Pursiainen Jouni

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits/80 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th or 5th spring

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:

30 hours of lectures, 50 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:

Gates, B.C.: Catalytic Chemistry, John Wiley & Sons, 1992, partly. 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

782627S: Chemical Applications in Hazardous Waste Management and Environmental Technology, 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Toivo Kuokkanen

Opintokohteen kielet: Finnish

ECTS Credits:

4 credits/107 hours of work

Language of instruction:

Finnish. The course can be completed in English as a book examination.

Timing:

4th or 5th spring. The course is lectured every other year.

Learning outcomes:

After completing this course, the student should have acquired knowledge and understanding of theory and practice with chemical applications in utilization and disposal of chemical wastes, especially hazardous wastes as well as know new chemical environmental technologies, which have developed for waste utilization according to the EU's tightening waste legislation.

Contents:

Principles of EU/Finnish waste legislation, principles and activities in management of hazardous and other chemical wastes, modern treating methods of chemical wastes, new chemical methods and technologies in the utilization of chemical wastes, especially hazardous wastes.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

27 hours of lectures + 2 industrial visits (4 h), 3 hours of seminar + 10 hours of home work and independent work 63 h

Target group:

Chemistry, environmental technology, optional

Prerequisites and co-requisites:

Basic Principles in Green Chemistry (780372A)

Recommended optional programme components:

Basic Principles in Green Chemistry (780372A)

Recommended or required reading:

Clark, J.H.: Chemistry of Waste Minimization, Blackie Academic & Professional, Glasgow 1995, partly and material handed out by the lecturer (212 pp).

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:

Doc. Toivo Kuokkanen

Working life cooperation:

No

Other information:

No

780321A: Chemical Legislation in Finland, 1 op**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Department of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Mika Virtanen**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

780681S Chemical Legislation in Finland 1.0 op

ECTS Credits:

1 credit/27 hours of work

Language of instruction:

Finnish

Timing:

3rd spring

Learning outcomes:

After completion of the course students have a basic understanding of Finnish legislation concerning chemistry and occupational health. He/she is acquainted with the limitations of the use of dangerous chemicals and is able to find updated information of them. After completion of the course students should also have a basic understanding of the main laws of pressure containers and tanks of compressed gases as well as of radiation.

Contents:

Safety at work, sanitarily and environmentally hazardous chemicals, explosive materials and combustible liquids, pressure containers and tanks of compressed gases.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

6 hours of work, 21 hours of self-study

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

No specific prerequisites

Recommended optional programme components:

The contents and credits of this course are the same as in the course 780681S Chemical Legislation in Finland. The student can perform the course only once: 780321A or 780681S.

Recommended or required reading:

Työpaikan lakikirja. Työpaikan kemikaalilainsäädäntö.

Assessment methods and criteria:

Final examination

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

The course utilizes verbal grading scale pass/fail.

Person responsible:

Laboratory Manager, PhD. Mika Virtanen

Working life cooperation:

No

Other information:

Compulsory in the B.Sc. Degree, if the student has started his/her studies before 1st August 2012.

782634S: Chemistry in industrial applications, 3 op**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Department of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Ulla Lassi

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits/80 hours of work

Language of instruction:

Finnish/English on demand.

Timing:

4th or 5th spring. The course is lectured every other year.

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

Learning activities and teaching methods:

30 hours of lectures, 50 hours of self-study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Physical Chemistry I (780347A) and Physical Chemistry II (782631S)

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 examinations

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

782636S: Chemistry of Hydrometallurgical processes, 3 op

Voimassaolo: 01.08.2012 - 31.07.2017

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Ulla Lassi

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits/80 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 2015.

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

Learning activities and teaching methods:

30 hours of lectures, self-study 50 hours

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

781610S: Chemistry of Metal Complexes, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Leena Kaila

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits /80 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th or 5th autumn. The course is lectured every other year, the next time is during the autumn 2014.

Learning outcomes:

A profound understanding of concepts of coordination equilibrium, complex compounds in aqueous solutions and their solution equilibrium.

Contents:

Concepts of metal complexes in aqueous solutions, experimental methods, methods for construction and refinement of equilibrium models, applications.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

20 hours of lectures, 60 hours of self-study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Introduction to Analytical Chemistry (780111P)

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 by the lecturer

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:

Lecturer Leena Kaila

Working life cooperation:

No

Other information:

No

783627S: Chemistry of Natural Substances I, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Marja Lajunen

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits/80 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th or 5th year. The course is lectured every other year.

Learning outcomes:

After this course the student can classify basic types of carbohydrates and lipids, use concepts and terminology related to them, explain their biosynthetic background and occurrence, analyze properties, evaluate and plan essential synthetics.

Contents:

Carbohydrates, their types, structures and reactivity, anomeric effect, mutarotation and consequences from these, protection, and glycosylation. Lipids: Fatty acids, eicosanoids, prostaglandins, phospholipids, their biosynthesis, chemistry and role in natural science.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

20 hours of lectures and exercises, 60 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:

Material handed out by the lecturer. Davis, B.G. and Fairbanks, A.J.: Carbohydrate Chemistry, Oxford Chemistry Primers, 2002, partly; Dewick, Paul M.: Medicinal Natural Products, A Biosynthetic Approach, Wiley & Sons Ltd, 1998.

Assessment methods and criteria:

Exercises in the class, 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. Marja Lajunen

Working life cooperation:

No

Other information:

No

783641S: Chemistry of Natural Substances II, 3 op**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Department of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Marja Lajunen**Opintokohteen kielet:** Finnish**ECTS Credits:**

3 credits/80 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th or 5th year. The course is lectured every other year.

Learning outcomes:

After this course the student can classify types of terpenoids, steroids and alkaloids of natural substances, can explain their biosynthetic background and occurrence, analyze their properties and effects or evaluate their chemical reactivity.

Contents:

Natural products from secondary metabolism: Terpenoids, steroids and alkaloids, their origin through secondary metabolism and properties.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

20 hours of lectures and exercises, 60 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:

Material handed out by the lecturer and Dewick, Paul M.: Medicinal Natural Products, A Biosynthetic Approach, Wiley & Sons Ltd, 1998, Chapters 2, 5, and 6.

Assessment methods and criteria:

The students will compile a learning diary all through the course unit, and the learning diary will be assessed. The assessment affects 50%. 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. Marja Lajunen

Working life cooperation:

No

Other information:

No

781621S: Chemistry of Non-Metals, 3 op**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Department of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Raija Oilunkaniemi**Opintokohteen kielet:** Finnish

ECTS Credits:

3 credits/80 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 2014.

Learning outcomes:

This course will give the student an overview of the development of chemistry of non-metals by examining the current literature of the field.

Contents:

New methods in the synthesis of non-metallic compounds, structural chemistry, and chemical properties of non-metallic compounds.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

18 hours of lectures, 16 hours of seminar, 46 hours of self-study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Inorganic Chemistry I (780353A) ja Inorganic Chemistry II (780391A)

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 by the lecturer

Assessment methods and criteria:

The assessment of the course is based on the final examination, attendance at the lectures and seminars, and a seminar presentation

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:

Doc. Raija Oilunkaniemi

Working life cooperation:

No

Other information:

No

783635S: Chemistry of Paints and Surface Coatings, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Hormi Osmo

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits/80 hours of work

Language of instruction:

Finnish/English on demand.

Timing:

4th or 5th year. The course is lectured every other year, next time during the spring 2015.

Learning outcomes:

After passing the course the student can explain the chemical composition of paints and coatings and can illustrate modern technologies used in the preparation of paint / coating formulations.

Contents:

Most important polymers used as binders in paints / coatings, introduction to colour theory, new technologies used in the preparation of paints / coatings.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

24 hours of lectures, 56 hours of self study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Introduction to Polymer Chemistry (780326A783650S)

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:

Paul, S.: Surface Coatings Science and Technology, John Wiley & Sons, New York, 1986.

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. Osmo Hormi

Working life cooperation:

No

Other information:

No

781613S: Chemistry of Rare Earth Elements, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Laitinen Risto

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits/80 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 2014.

Learning outcomes:

This course will familiarize students with the properties and applications of rare earths.

Contents:

Occurrence and separation properties of rare earths, chemical and physical characteristics (especially spectroscopic), coordination chemistry, and most important applications.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

18 hours of lectures, 62 hours of self-study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Inorganic Chemistry I (780353A) and Inorganic Chemistry II (781642S)

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:

Cotton, S.: Lanthanide and Actinide Chemistry, John Wiley & Sons, Chichester, 2006.

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:

Prof. Risto Laitinen

Working life cooperation:

No

Other information:

No

781645S: Chemistry of Solid Fuels Ashes, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Minna Tiainen

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits/80 hours of work

Language of instruction:

Finnish/English on demand.

Timing:

4th or 5th year. The course is lectured every other year, next time during the spring 2015.

Learning outcomes:

Upon completion the student should have acquired an understanding of chemistry of combustion process, formation mechanisms of ashes and ash related problems.

Contents:

Solid fuels, ash forming material, combustion techniques, heterogeneous combustion, ash formation mechanisms, ash related problems in boiler, analytical methods (SEM-EDS).

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

20 hours of lectures, portfolio 10 hours, essay 10 hours, self-study 40 hours

Target group:

Chemistry, optional

Prerequisites and co-requisites:

780353A Inorganic Chemistry I

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:

Raiko, R., Saastamoinen, J., Hupa, M. ja Kurki-Suonio, I., Poltto ja palaminen, Gummerus Oy, Jyväskylä (in Finnish).

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

781644S: Computational Inorganic Chemistry, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Laitinen Risto

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits/80 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th or 5th year. The course is lectured every other year, next time during the spring 2015.

Learning outcomes:

After this course the student is familiar with review of computational methods in quantum inorganic chemistry.

Contents:

Review of computational methods in quantum chemistry (molecular mechanics, semiempirical methods, ab initio methods, DFT methods), basis sets, computation of molecular properties, transition states, spectroscopic properties. The application of the methods in inorganic chemistry will be illustrated by examples from current literature.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

28 hours of lectures, 14 hours of exercises, 38 hours of self-study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Inorganic Chemistry I (780353A), Inorganic Chemistry II (781642S), Physical Chemistry I (780347A), and Physical Chemistry II (782631S)

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:

Recommended reading: Young, D.: Computational Chemistry: A Practical Guide for Applying Techniques to Real World Problems, Wiley-Interscience, 2001; Hinchliffe, A.: Molecular Modelling for Beginners, John Wiley & Sons Ltd, 2003.

Assessment methods and criteria:

Final examination or as agreed

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:

Doc. Heikki Tuononen (University of Jyväskylä) and Prof. Risto Laitinen

Working life cooperation:

No

Other information:

No

784626S: Computer Analysis of NMR Spectra, 2 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Mattila, Sampo Antero

Opintokohteen kielet: Finnish

ECTS Credits:

2 credits/53 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th or 5th autumn. The course is lectured every other year.

Learning outcomes:

After this course the student is familiar with computer aided NMR spectral processing and production, and assignment tools.

Contents:

The basic theory for analysing NMR spectra; the structure, function and use of simulating and iterating analysis programs.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

8 hours of lectures + 28 hours of exercises, 17 hours of self-study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

784623S NMR Workshop I

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:

Günther, H.: NMR Spectroscopy, 2nd ed., Wiley, 1995, partly. Laatikainen, R. ja Niemitz, M.: Perch, An Integrated software for Analysis of NMR spectra on PC, University of Kuopio, 1994.

Assessment methods and criteria:

The seminar at the end of the course, exercises and home assignments
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

781632S: Determination of Trace Elements, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Paavo Perämäki

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits /80 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 2015.

Learning outcomes:

At the end of the course, the students should have acquired an understanding of special tasks that must be taken into account when very low element concentrations are measured.

Contents:

Sampling and sample preparation in trace and ultra trace elemental analysis, systematic errors (losses and contamination), clean rooms, separation and preconcentration techniques, hyphenated techniques.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

24 hours of lectures + 56 hours of self-study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Sampling and Sample Preparation (781640S)

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 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:

Ei

782635S: Electrochemistry, 3 op

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Ulla Lassi

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits/ 80 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th or 5th Autumn. The course is lectured every other year, the next time is during the autumn 2014

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-face teaching

Learning activities and teaching methods:

30 hours of lectures, self-study 50 hours.

Target group:

Chemistry, optional

Prerequisites and co-requisites:

780347A Physical Chemistry I and 780392A/782631S 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, Korpiljyvä 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:

30 hours of lectures, self-study 50 hours.

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

781633S: Experimental Design, 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Paavo Perämäki

Opintokohteen kielet: Finnish

ECTS Credits:

4 credits /107 hours of work

Language of instruction:

Finnish

Timing:

4th or 5th spring. The course is lectured every other year, next time during the spring 2014.

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 + 77 hours of self-study incl. computer aided analysis of experimental data

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Statistical Methods in Analytical Chemistry (781631S)

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

782618S: High Pressure Kinetics, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Toivo Kuokkanen

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits/80 hours of work

Language of instruction:

Finnish. The course can be completed in English as a book examination.

Timing:

4th or 5th year. The course is lectured every other year.

Learning outcomes:

Upon completion of the course, the student should have acquired knowledge and understanding of different effects of pressure on various chemical reactions, especially on reaction rates. In addition, students are able to take advantage of the use of pressure for various applications in chemical use.

Contents:

Chemical applications of high pressure, determination and calculation of activation volumes, activation volumes of different reaction classes, reaction kinetics by UV/Vis spectrometric methods, especially organic host-guest reactions, aerobic and anaerobic biodegradation and its determination by BOD OxiTop methods.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

20 hours of lectures + 2 hours of demonstration + three home works 10 hours, and independent self-study 48 hours

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Physical Chemistry I (780347A) and Physical Chemistry II (782631S) passed.

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 in the lecture and partly: Porter, G.: Progress in Reaction Kinetics, Pergamon Press, Oxford, 1970., van Eldik, R.: Inorganic High Pressure Chemistry, Elsevier, New York 1986 and Reichardt, C.: Solvents and Solvent Effects in Organic Chemistry, 3th ed., Wiley-VCH Verlag GmbH, Weinheim 2003

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:

Doc. Toivo Kuokkanen.

Working life cooperation:

No

Other information:

No

781638S: ICP-MS Workshop, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Paavo Perämäki

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits/80 hours of work

Language of instruction:

Finnish

Timing:

4th or 5th spring. The course is lectured every other year, next time during the spring 2014.

Learning outcomes:

Upon completion of the course, student should have acquired knowledge and understanding of modern ICP-MS techniques and various applications of these techniques.

Contents:

ICP as an ion source, instrumentation (e.g. mass analyzers) and their properties, matrix and other interference effects and their elimination, special sample introduction techniques.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

20 hours of lectures and demonstrations + seminar presentation + practical exercise + 60 hours of self-study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Instrumental Analysis (780328A)

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 by lecturer

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

780341A: Industrial Training I, 2 op

Opiskelumuoto: Intermediate Studies

Laji: Practical training

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

2 credits/ 120 hours of practical work

Language of instruction:

Finnish/English on demand

Timing:

2nd or 3rd year

Learning outcomes:

Upon completion the course, the student is able to discuss about working life his/her own specialisation line in industry. The student can analyze and evaluate the things which he/she learned during the the course.

Contents:

Instructed practicing in industry or in a research institute. Three weeks working gives two credits.

Mode of delivery:

Face-to-face teaching and working in the training job

Learning activities and teaching methods:

Practical training during summer

Target group:

Chemistry, optional. The course can be taken only by students who have chemistry as major studies.

Prerequisites and co-requisites:

The first year studies in chemistry at least

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 received in the training job

Assessment methods and criteria:

Instructed practicing in industry or in a research institute. Three weeks working is gives two credits.

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

Grading:

The course utilizes verbal grading scale pass/fail.

Person responsible:

Teachers, Amanuensis

Working life cooperation:

Yes

Other information:

The course can be performed as foreign industrial training.

(<http://www oulu.fi/english/studying/internship-offers-abroad#2>)

780342A: Industrial Training II, 4 op

Opiskelumuoto: Intermediate Studies

Laji: Practical training

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

4 credits/ 240 hours of practical training

Language of instruction:

Finnish/English on demand

Timing:

2nd or 3rd year

Learning outcomes:

Upon completion the course, the student is able to discuss about working life his/her own specialisation line in industry. The student can analyze and evaluate the things which he/she learned during the the course.

Contents:

Instructed practicing in industry or in a research institute. Three weeks working gives two credits.

Mode of delivery:

Face-to-face teaching and working in the training job

Learning activities and teaching methods:

Practical training during summer

Target group:

Chemistry, optional. The course is only for the major students.

Prerequisites and co-requisites:

The first year chemistry studies at least

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 received in the training job

Assessment methods and criteria:

Instructed practicing in industry or in a research institute. Three weeks working is gives two credits.

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

Grading:

The course utilizes verbal grading scale pass/fail.

Person responsible:

Teachers, Amanuensis

Working life cooperation:

Yes

Other information:

The course can be performed as foreign industrial training

(<http://www oulu.fi/english/studying/internship-offers-abroad#2>).

780343A: Industrial Training III, 6 op

Opiskelumuoto: Intermediate Studies

Laji: Practical training

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish**ECTS Credits:**

6 credits/360 hours of practical training

Language of instruction:

Finnish/English on demand

Timing:

2nd or 3rd period

Learning outcomes:

Upon completion the course, the student is able to discuss about working life his/her own specialisation line in industry. The student can analyze and evaluate the things which he/she learned during the the course.

Contents:

Instructed practicing in industry or in a research institute. Three weeks working gives two credits.

Mode of delivery:

Face-to-face teaching and working in the training job

Learning activities and teaching methods:

Practical training during summer

Target group:

Chemistry, optional. The course is only for the major students.

Prerequisites and co-requisites:

The first year studies in chemistry at least

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 received in the training job

Assessment methods and criteria:

Instructed practicing in industry or in a research institute. Three weeks working is gives two credits.

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

Grading:

The course utilizes verbal grading scale pass/fail.

Person responsible:

Teachers, Amanuensis

Working life cooperation:

Yes

Other information:

The course can be performed as foreign industrial training (<http://www oulu fi/english/studying/internship-offers-abroad#2>).

781642S: Inorganic Chemistry II, 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

780391A Inorganic Chemistry II 4.0 op

780361A Inorganic Chemistry II 4.0 op

ECTS Credits:

4 credits/107 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th spring. The course is lectured every year.

Learning outcomes:

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

Contents:

Structure and bonding 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:

22 hours of lectures, 16 hours of exercises, self-study (including 8 home assignments) 69 hours

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

Inorganic Chemistry I (780353A) 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:

Atkins, P., Overton, T., Rourke, J., Weller, M., and Armstrong, F., Inorganic Chemistry, 5th ed., Oxford University Press, 2009. Chapters 7, 19-23, 26-27

Assessment methods and criteria:

The assessment of the course is based on the final examination and home assignments

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:

Doc. Raija Oilunkaniemi

Working life cooperation:

No

Other information:

The content and credits of the course are the same as the course 780391A inorganic Chemistry II. The student can perform the course once: 780391A Inorganic Chemistry II or 781642S Inorganic Chemistry II.

782629S: Interactions between Molecules, 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Pursiainen Jouni

Opintokohteen kielet: Finnish

ECTS Credits:

4 credits/107 hours of work

Language of instruction:

Finnish or English on demand

Timing:

4th or 5th spring

Learning outcomes:

Upon successful completion students should have a basic understanding of the principles and applications of intermolecular interactions. Non-covalent intermolecular interactions have fundamental effects in practically all the applications of modern chemistry, including solvent interactions, surface chemistry, catalysis and supramolecular chemistry.

Contents:

Principles and applications of intermolecular interactions. Electrostatic, van der Waals and pi-pi bonding. Host-guest interactions. Solvent effects and Huges-Ingold rules. Applications to solvent interactions, surface chemistry, catalysis and supramolecular chemistry.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

40 hours of lectures, 57 hours of self-study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Physical Chemistry I (780347A) and Physical Chemistry II (782631S)

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.W.: Physical Chemistry, Oxford University Press, Oxford, 8th ed.(2006), Chapters 18-19. Reichart, C.: Solvents and Solvent Effects in Organic Chemistry, 2nd ed., VCH, 1990, 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. Jouni Pursiainen

Working life cooperation:

No

Other information:

No

783650S: Introduction to Chemistry, 2 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Hormi Osmo

Opintokohteen kielet: Finnish

Leikkaavuudet:

780326A Introduction to Polymer Chemistry 2.0 op

ECTS Credits:

2 ECTS credits/ 53 hours of work

Language of instruction:

Finnish, English on demand

Timing:

4th or 5th spring

Learning outcomes:

After passing the course the student can explain the basics in chemistry of polymeric materials with emphasis on commodity plastics.

Contents:

Different classifications of polymeric materials, most important terms in polymer chemistry, basics in the nomenclature of polymers, most important molecular weights of polymers, additives, glass transition temperature, the chemistry involved in the preparation of commodity plastics.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

20 hours of lectures, 33 hours self-study

Target group:

Chemistry

Prerequisites and co-requisites:

Introduction to Organic Chemistry (780103P or 780112P)

Recommended optional programme components:

The contents and credits of this course are the same as in the course 780326A Introduction to Polymer Chemistry. The student can perform this course only once: 780326A Introduction to Polymer Chemistry or 783650S Introduction to Polymer Chemistry.

Recommended or required reading:

Stevens, M.P.: Polymer Chemistry, An Introduction, 3rd ed, Oxford University Press, Oxford, 1999.

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. Osmo Hormi

Working life cooperation:

No

Other information:

The course (780326A) is compulsory in the B.Sc. for those students who have started their studies before 1st August 2012.

783638S: Introduction to Fiber Chemistry of Polysaccharides, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Hormi Osmo

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits/80 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 autumn 2013.

Learning outcomes:

After passing the course the student can classify the most important chemicals used in papermaking.

Contents:

The fibre and its behaviour during papermaking, dry strength, wet strength, colloidal stability, retention and dewatering, water penetration and sizing, fillers and pigments, dyes, foam control, slime control.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

24 hours of lectures, 56 hours of self study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Introduction to Polymer Chemistry (780326A/783650S)

Recommended optional programme components:

Previous name Paper Chemistry

Recommended or required reading:

Eklund, D. ja Lindström, T.: Paper Chemistry, An Introduction, DT Paper Science Publication, Grankulla, 1991.

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. Osmo Hormi

Working life cooperation:

No

Other information:

No

780112P: Introduction to Organic Chemistry, 4 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Johanna Kärkkäinen

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay780112P Introduction to Organic Chemistry (OPEN UNI) 4.0 op

780103P Introduction to Organic Chemistry 6.0 op

780103P2 Organic Chemistry I 6.0 op

780108P Basic Course in Organic Chemistry 6.0 op

ECTS Credits:

4 credits/107 hours of work

Language of instruction:

Finnish. Book-examination in English as well.

Timing:

1 st autumn and 1 st spring

Learning outcomes:

Upon completion of the course, the student can identify functional groups and structures of organic compounds, nomenclature, properties and reactions, can describe fundamentals of organic chemistry and use its terminology.

Contents:

Functional groups and nomenclature of organic compounds, basic principles of stereochemistry, reactions with applications.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

32 hours of lectures and applications, 75 hours of self study

Target group:

Biology, Process Engineering, Environmental Engineering, compulsory.

Physical Sciences, Geology, Geography, Mathematical Sciences, optional.

Prerequisites and co-requisites:

Upper secondary school chemistry

Recommended optional programme components:

This 4 credits course is a part of the course 780103P Introduction to organic Chemistry 6 credits. Hence, students attend the lectures of 780103 P Introduction of Organic Chemistry 6 credits.

The student can make up this course to the course 780103 P Introduction to organic Chemistry 6 credits.

Recommended or required reading:

Hart, H., Hart, D.J. and Craine, L.E.: Organic Chemistry: A Short Course, 10 th or a 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 or a 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:

Ph.D. Johanna Kärkkäinen

Working life cooperation:

No

Other information:

Students attend the lectures of 780103 P Introduction of Organic Chemistry 6 credits.

780326A: Introduction to Polymer Chemistry, 2 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Hormi Osmo

Opintokohteen kielet: Finnish

Leikkaavuudet:

783650S Introduction to Chemistry 2.0 op

ECTS Credits:

2 credits/ 53 hours of work

Language of instruction:

Finnish

Timing:

spring

Learning outcomes:

After passing the course the student can explain the basics in chemistry of polymeric materials with emphasis on commodity plastics.

Contents:

Different classifications of polymeric materials, most important terms in polymer chemistry, basics in the nomenclature of polymers, most important molecular weights of polymers, additives, glass transition temperature, the chemistry involved in the preparation of commodity plastics.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

20 hours of lectures, 33 hours self-study

Target group:

Chemistry

Prerequisites and co-requisites:

Introduction to Organic Chemistry (780103P or 780112P)

Recommended optional programme components:

The content and credits of this course are the same as in the course 783650S Introduction to Polymer Chemistry. The student can perform this course only once: 780326A Introduction to Polymer Chemistry or 783650S Introduction to Polymer Chemistry.

Recommended or required reading:

Stevens, M.P.: Polymer Chemistry, An Introduction, 3rd ed, Oxford University Press, Oxford, 1999.

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. Osmo Hormi

Working life cooperation:

No

Other information:

The course is compulsory for the students who have started their studies before 1st August, 2012.

780332A: Laboratory Course I in Organic Chemistry, 4 op

Voimassaolo: - 31.07.2013

Opiskelumuoto: Intermediate Studies

Laji: Course

Arvostelu: 1 - 5, pass, fail

Opettajat: Juha Heiskanen

Opintokohteen kielet: Finnish

ECTS Credits:

4 credits/107 hours of work

Language of instruction:

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

Timing:

2nd autumn

Learning outcomes:

Upon completion of the course, the student is familiar with safety issues, glassware and equipment, use of laboratory notebook and written reporting of laboratory experiments. He/she should be able to work by using basic techniques of organic chemistry such as distillation, extraction, crystallization, TLC. The student familiarizes with practical laboratory work by carrying out aromatic substitution with protective group strategy, an organometallic reaction, Aldol condensation, elimination and disproportionation.

Contents:

Review of methods in organic chemistry and TLC analysis. Producing of spectra, and GC analysis, Aldol condensation, Cannizzaro reaction, preparation of benzoic acid, preparation of cyclohexene, and preparation of 2-nitroresorcinol.

Mode of delivery:

Face-to-face teaching in the laboratory

Learning activities and teaching methods:

50 hours of supervised laboratory, independent laboratory work and 57 hours of self-study and reporting

Target group:

Biochemistry, optional

Prerequisites and co-requisites:

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) passed.

Recommended optional programme components:

-

Recommended or required reading:

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

Assessment methods and criteria:

Works, reports and the final exam passed.

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

Grading:

1-5/fail

Person responsible:

Juha Heiskanen

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.

781641S: Laboratory Course in Synthetic Inorganic Chemistry, 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

4 credits/107 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th or 5th spring. The course is next time in the curriculum during the spring 2015. The course is performed as an intensive two-week period.

Learning outcomes:

After this course the student is familiar with most important advanced techniques in modern inorganic synthetic chemistry.

Contents:

One selected multistage synthesis. The intermediate and end products will be fully characterized.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

6 hours of lectures, 60 hours of laboratory work, 41 hours of self-study (including laboratory report)

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Laboratory courses in Inorganic Chemistry, Physical Chemistry and Organic Chemistry, Structural Chemistry I (780317A).

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 by the lecturer

Assessment methods and criteria:

The assessment of the course is based on the final examination and acceptance of practical work and the report. 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. Risto Laitinen and Doc. Raija Oilunkaniemi

Working life cooperation:

No

Other information:

No

783605S: Literature Survey in Organic Chemistry, 9 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

9 credits/240 hours of work

Language of instruction:

Finnish, English on demand

Timing:

5th autumn, beginning

Learning outcomes:

After finishing the Master's Thesis the student has got practice for the scientific reasoning and communication, information retrieval and its critical evaluation.

Contents:

The student is required to write a survey of literature on a topic which will be decided together with the student's advisor. The Master's Thesis can be, but does not necessarily have to be, on the same topic as the Research project. The length of the survey should be about 40-60 pages with approximately 50 references.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

240 hours of work

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

The Master's Thesis can be started, when all studies for the B.Sc. degree have been completed.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

240 hours of work

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

Grading:

1-5/fail

Person responsible:

Professors, Docents, Dr level Senior Assistants and Lectures of the Chemistry Department.

Working life cooperation:

No

Other information:

The Survey of Literature must be sent to the Urkund system before evaluation.

781627S: Main Group Chemistry, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Laitinen Risto

Opintokohteen kielet: Finnish

ECTS Credits:

5 credits/131 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th or 5th year. The course is lectured every other year.

Learning outcomes:

After this course the student is familiar with recent progress in modern main group chemistry.

Contents:

Periodic system, hydrogen, alkali and alkaline earth metals, half- and non-metals.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

28 hours of lectures, 14 hours of exercises, 89 hours of self-study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Inorganic Chemistry I (780353A) and Inorganic Chemistry II (780391A)

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., Overton, T., Rourke, J., Weller, M. ja Armstrong, F.: Inorganic Chemistry, 5th ed., Oxford University Press, Oxford 2009.

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:

Prof. Risto Laitinen

Working life cooperation:

No

Other information:

No

781601S: Master's Thesis in Inorganic Chemistry, 38 op

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

38 credits/1015 hours of work

Language of instruction:

Finnish, English on demand

Timing:

5th autumn, beginning

Learning outcomes:

After finishing the Thesis the student has got practice for the scientific reasoning and communication, information retrieval and its critical evaluation. The student can use research methods typical for his/her field and is familiar with the theoretical subject matter of his/her field.

Contents:

The Theses for the degree of M.Sc. consists of two parts: a research project (Master's Thesis) with a written report and survey of literature. The completion of the laboratory work and the research report is expected to take approximately four months of full-time work. Together, they are worth 38 ECTS credits. In addition, the student is required to write a survey of literature on a topic which will be decided together with the student's advisor. The survey can be, but does not necessarily have to be, on the same topic as the research project. The length of the survey should be about 40-60 pages with approximately 50 references. It is worth of 9 ECTS credits. The completion of the whole thesis (47 ECTS credits altogether) requires about six months of full-time work.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

1015 hours of laboratory work

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

The Master's Thesis can be started when all studies for the B.Sc. Degree and the Research Project have been completed.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

A research project (Master's Thesis) with a written report and a survey of literature.

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

Grading:

1-5/fail

Person responsible:

Professors, Docents, Dr level Senior Assistants and Lectures of the Chemistry Department.

Working life cooperation:

No

Other information:

Master,s Thesis must be sent to the Urkun system before evaluation.

783601S: Master's Thesis in Organic Chemistry, 38 op

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

38 credits/1015 hours of work

Language of instruction:

Finnish, English on demand

Timing:

5th autumn, beginning

Learning outcomes:

After finishing the Thesis the student has got practice for the scientific reasoning and communication, information retrieval and its critical evaluation. The student can use research methods typical for his/her field and is familiar with the theoretical subject matter of his/her field.

Contents:

The Theses for the degree of M.Sc. consists of two parts: a research project (Master's Thesis) with a written report and survey of literature. The completion of the laboratory work and the research report is expected to take approximately four months of full-time work. Together, they are worth 38 ECTS credits. In addition, the student is required to write a survey of literature on a topic which will be decided together with the student's advisor. The survey can be, but does not necessarily have to be, on the same topic as the research project. The length of the survey should be about 40-60 pages with approximately 50 references. It is worth of 9 ECTS credits. The completion of the whole thesis (47 ECTS credits altogether) requires about six months of full-time work.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

1015 hours of laboratory work

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

The Master's Thesis can be started when all studies for the B.Sc. Degree and the Research Project have been completed.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

A research project (Master's Thesis) with a written report and a survey of literature.

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

Grading:

1-5/fail

Person responsible:

Professors, Docents, Dr level Senior Assistants and Lectures of the Chemistry Department.

Working life cooperation:

No

Other information:

The Master's Thesis must be sent to the Urkund system before evaluation.

782601S: Master's Thesis in Physical Chemistry, 38 op

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

38 credits/1015 hours of work

Language of instruction:

Finnish, English on demand

Timing:

5th autumn, beginning

Learning outcomes:

After finishing the Thesis the student has got practice for the scientific reasoning and communication, information retrieval and its critical evaluation. The student can use research methods typical for his/her field and is familiar with the theoretical subject matter of his/her field.

Contents:

The Theses for the degree of M.Sc. consists of two parts: a research project (Master's Thesis) with a written report and survey of literature. The completion of the laboratory work and the research report is expected to take approximately four months of full-time work. Together, they are worth 38 ECTS credits. In addition, the student is required to write a survey of literature on a topic which will be decided together with the student's advisor. The

survey can be, but does not necessarily have to be, on the same topic as the research project. The length of the survey should be about 40-60 pages with approximately 50 references. It is worth of 9 ECTS credits. The completion of the whole thesis (47 ECTS credits altogether) requires about six months of full-time work

Mode of delivery:

face-to-face teaching

Learning activities and teaching methods:

1015 hours of laboratory work

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

The Master's Thesis can be started when all studies for the B.Sc. Degree and the Research Project have been completed.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

A research project (Master's Thesis) with a written report and a survey of literature.

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

Grading:

1-5/fail

Person responsible:

Professors, Docents, Dr level Senior Assistants and Lectures of the Chemistry Department.

Working life cooperation:

No

Other information:

The Master's Thesis must be sent to the Urkund system before evaluatio.

784601S: Master's Thesis in Structural Chemistry, 38 op

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

38 credits/1015 hours of work

Language of instruction:

Finnish, English on demand

Timing:

5th autumn, beginning

Learning outcomes:

After finishing the Thesis the student has got practice for the scientific reasoning and communication, information retrieval and its critical evaluation. The student can use research methods typical for his/her field and is familiar with the theoretical subject matter of his/her field.

Contents:

The Theses for the degree of M.Sc. consists of two parts: a research project (Master's Thesis) with a written report and survey of literature. The completion of the laboratory work and the research report is expected to take approximately four months of full-time work. Together, they are worth 38 ECTS credits. In addition, the student is required to write a survey of literature on a topic which will be decided together with the student's advisor. The survey can be, but does not necessarily have to be, on the same topic as the research project. The length of the survey should be about 40-60 pages with approximately 50 references. It is worth of 9 ECTS credits. The completion of the whole thesis (47 ECTS credits altogether) requires about six months of full-time work.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

1015 hours of laboratory work

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

The Master's Thesis can be started when all studies for the B.Sc. Degree and the Research Project have been completed.

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

A research project (Master's Thesis) with a written report and a survey of literature.

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

Grading:

1-5/fail

Person responsible:

Professors, Docents, Dr level Senior Assistants and Lectures of the Chemistry Department.

Working life cooperation:

No

Other information:

The Master's Thesis must be sent to the Urkund system before evaluation.

781639S: Molecular Symmetry and Spectroscopy, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Raija Oilunkaniemi

Opintokohteen kielet: Finnish

Leikkaavuudet:

780327A Structural Chemistry II 5.5 op

ECTS Credits:

5 credits/131 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th spring. The course is lectured next time during the spring 2014.

Learning outcomes:

After this course the student is familiar with molecular symmetry and application of molecular symmetry in vibration spectroscopy and electronic absorption spectroscopy.

Contents:

Molecular symmetry, group theory, vibrational spectroscopy, electronic absorption spectroscopy.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

34 hours of lectures, 97 hours of self-study (including 3 home assignments)

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Inorganic Chemistry I (780353A) and Inorganic Chemistry II (781642S)

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 by lecturer

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:

Doc. Raija Oilunkaniemi

Working life cooperation:

No

Other information:

No

784617S: Multinuclear NMR Spectroscopy in Structure Elucidation, 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Mattila, Sampo Antero

Opintokohteen kielet: Finnish

ECTS Credits:

4 credits/107 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th or 5th spring. The course is lectured every other year.

Learning outcomes:

After this course the student is familiar with the NMR characteristics and use of various magnetic isotopes.

Contents:

The correlation of structural factors to spin-spin coupling constants and relaxation times of the nuclei in ^{14}N , ^{15}N , ^{17}O , ^{19}F , ^{29}Si , ^{31}P , ^{77}Se and ^{195}Pt . A practical exercise and a report.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

20 hours of lectures + applications + demonstrations, 87 hours of self-study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

780317A/784640S Structural Chemistry I

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:

Mason, J. (ed.): Multinuclear NMR, Plenum Press, New York, 1987

Assessment methods and criteria:

The seminar at the end of the course, exercises and home assignments
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

784610S: NMR Spectroscopy in Organic Chemistry, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Mattila, Sampo Antero

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits/80 hours of work

Language of instruction:

Finnish/English on demand.

Timing:

4th autumn. The course is lectured every other year.

Learning outcomes:

After this course the student is familiar with the principles, methods, techniques and practise of structure elucidation of organic compounds by NMR spectroscopy.

Contents:

Modern multidimensional NMR techniques. Spectral runs, analysis and report of an unknown compound.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

14 hours of lectures + applications, 60 hours of exercises, 7 hours of self-study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

NMR Workshop I (784623S)

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:

Breitmaier, E.: Structure Elucidation by NMR in Organic Chemistry, A Practical Guide, Wiley, 1993.

Assessment methods and criteria:

The seminar at the end of the course, exercises and home assignments

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

784623S: NMR Workshop I, 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Mattila, Sampo Antero

Opintokohteen kielet: Finnish

ECTS Credits:

4 credits/107 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th autumn or spring. The course is lectured every other year.

Learning outcomes:

After this course the student is familiar with the common 1D and 2D NMR methods and their principles.

Contents:

A1D, 2D NMR techniques. Optimization of NMR measurement parameters: Theory and practice. NMR data processing.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

20 hours of lectures + demonstrations, 80 hours of exercises, 7 hours of self-study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Structural Chemistry I (780317A/784640S)

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:

Hore P.J, Nuclear Magnetic Resonance, Oxford University Press; Derome, A. E., Modern NMR Techniques for Chemistry Research, Pergamon Press, partly.

Assessment methods and criteria:

The seminar at the end of the course, exercises and home assignments
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

784624S: NMR Workshop II, 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Mattila, Sampo Antero

Opintokohteen kielet: Finnish

ECTS Credits:

4 credits/107 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th spring. The course is lectured every other year.

Learning outcomes:

After this course the student is familiar with the advanced 1D and 2D NMR methods and has detailed understanding of pulse sequences in NMR.

Contents:

Product Operator Formalism. Pulse sequences: Design and programming. Use and programming of automatized spectrometer workflows.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

20 hours of lectures + demonstrations, 80 hours of exercises, 7 hours of self-study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

NMR Workshop I (784623S)

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:

Levitt, M.: Spin Dynamics: Basics of Nuclear Magnetic Resonance, John Wiley & Sons, 2001, partly, Derome, A. E., Modern NMR Techniques for Chemistry Research, Pergamon Press, partly.

Assessment methods and criteria:

The seminar at the end of the course, exercises and home assignments
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

784638S: NMR Workshop III, 4 op**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Department of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Mattila, Sampo Antero**Opintokohteen kielet:** Finnish**ECTS Credits:**

4 credits/107 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th spring. The course is lectured every other year.

Learning outcomes:

After this course the student is familiar with the techniques commonly used in elucidation of organic compounds and natural products.

Contents:

Sample preparation. Spetrometer setup. Use of automatized workflows of recording series of 1-3D NMR experiments. Spectral processing. Assignment of NMR data.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

20 hours of lectures + demonstrations, 80 hours of exercises, 7 hours of self-study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

NMR Workshop I (784623S)

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:

Derome, A. E., Modern NMR Techniques for Chemistry Research, Pergamon Press, partly

Assessment methods and criteria:

The seminar at the end of the course, exercises and home assignments

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

784639S: NMR Workshop IV, 4 op**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Department of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Mattila, Sampo Antero**Opintokohteen kielet:** Finnish**ECTS Credits:**

4 credits/107 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th spring. The course is lectured every other year.

Learning outcomes:

After this course the student is familiar with the 2-4D techniques commonly used in biomacromolecular NMR analysis.

Contents:

Protein backbone and sidechain 3D experiments. Other multidimensional methods. Magnetization transfer functions. Resolution and S/N. Processing of multidimensional NMR data.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

20 hours of lectures + demonstrations, 80 hours of exercises, 7 hours of self-study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

NMR Workshop I (784623S)

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:

Levitt, M.: Spin Dynamics: Basics of Nuclear Magnetic Resonance, John Wiley & Sons, 2001, partly and Cavanagh: Protein NMR Spectroscopy, Academic Press, 1995, ISBN: 0121644901.

Assessment methods and criteria:

The seminar at the end of the course, exercises and home assignments
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

783643S: Organic Chemistry II, 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Marja Lajunen

Opintokohteen kielet: Finnish

Leikkaavuudet:

780393A Organic Chemistry II 4.0 op

780390A Organic Chemistry II 4.0 op

ECTS Credits:

4 credits/107 hours of work

Language of instruction:

Finnish/English on demand.

Timing:

4th autumn. The course is lectured every year.

Learning outcomes:

After this course the student can profoundly explain and analyze mechanisms of polar additions and eliminations, as well as reactions of carbonyl compounds as nucleophilic reagents. The student can compare and judge properties and reactions of aromatic heterocyclics and apply these to a practical synthetic route design.

Contents:

Polar additions and eliminations, enols and enolates and their alkylation, aldol reaction, aromatic heterocyclics, their reactivity and reactions.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

35 hours of lectures , 7 hours of exercises, 65 hours of self study

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

Organic Chemistry I (780389A)

Recommended optional programme components:

The contents and credits of this course are the same as in the course 780393A Organic Chemistry II 4 credits.

The student can perform this course only once: 780393A Organic Chemistry II or 783643S Organic Chemistry II 4 credits.

Recommended or required reading:

Clayden, J., Greeves, N., Warren, S. ja Wothers, P.: Organic Chemistry, Oxford University Press, 2001. Chapters 19-21, 26, 27, 43.

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. Marja Lajunen

Working life cooperation:

No

Other information:

No

783639S: Organic Chemistry III, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Hormi Osmo

Opintokohteen kielet: Finnish

ECTS Credits:

5 credits/134 hours of work

Language of instruction:

Finnish/English on demand

Timing:

5th autumn. The course is lectured every year.

Learning outcomes:

After passing the course the student can complete the way of thinking used in modern synthetic organic chemistry. The student can also give a detailed presentation of the synthesis of a challenging goal molecule.

Contents:

Detailed examination of reactions used in the synthesis of complicated organic compounds such as Retigeranic Acid.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

26 hours of lectures + seminar, 108 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:

Previous name: Modern Synthetic Organic Chemistry

Recommended or required reading:

Corey, E.J. ja Chen, X-M.: The Logic of Chemical Synthesis, John Wiley & Sons, New York, 1989, p. 1 - 100.

Assessment methods and criteria:

Written report on the synthesis of a complex target molecule and an oral presentation of the synthesis.

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. Osmo Hormi

Working life cooperation:

No

Other information:

No

783614S: Organic Chemistry of Drug Compounds, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Marja Lajunen

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits/80 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th or 5th year

Learning outcomes:

After this course the student can describe essential features and steps of modern drug design and development. He/she can classify ways of actions and targets of drugs, can describe pharmacokinetic factors affecting to a drug, principles of QSAR and explain drug's action to DNA.

Contents:

Drug discovery and drug development, QSAR, combinatorial synthesis, computers in medicinal chemistry, drug action at enzymes and receptors, drugs interacting with DNA, drug metabolism, prodrugs and their activation.

Mode of delivery:

Bookexamination

Learning activities and teaching methods:

80 hours of self-study.

If the course is not lectured, one exam per year can be arranged by a separate agreement.

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:

Patrick, G.L.: An Introduction to Medicinal Chemistry, Oxford University Press, 2001, sivut XXII-98, 123-359.

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. Marja Lajunen

Working life cooperation:

No

Other information:

No

783640S: Organometallic Chemistry, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Marja Lajunen

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits/80 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th year. The course is lectured every other year, next time during the autumn 2014.

Learning outcomes:

After this course the student can judge, compare and use basic organometallic compounds in synthetic design and exploit their properties in practice.

Contents:

Chemistry of Li, Mg, Cu, B, or Si and their use in organic synthesis.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

24 hours of lectures and exercises, 56 hours of self study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

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., and Wothers, P., Organic Chemistry, Oxford University Press, 2001 (partly);

Jenkins, P.: Organometallic Reagents in Synthesis, Oxford Science Publications, 1997, partly. Thomas, S.E.:

Organic Synthesis, The Role of Boron and Silicon, Oxford Science Publications, 1997, partly.

Assessment methods and criteria:

Exercises in the class and 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. Marja Lajunen

Working life cooperation:

No

Other information:

No

783645S: Pericyclic chemistry, 3 op

Voimassaolo: 01.01.2008 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Marja Lajunen

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits/80 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th or 5th year, The course is lectured every other year, next time during autumn 2014.

Learning outcomes:

After this course unit the student can classify and analyze the nature and types of pericyclic reactions. He/she can describe and explain the occurrence of separate pericyclic reactions, basics of click chemistry and use them to design pericyclic reactions.

Contents:

Pericyclic reaction types: cycloadditions, sigmatropic rearrangements, group transfer and electrocyclic reactions. The Woodward-Hoffman rules, thermal, photochemical, 1,3-dipolar cycloaddition and basics of click chemistry alike.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

20 hours of lectures and exercises, 60 hours of self-study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

780389A Orgaaninen kemia I and 780393A/783643S Organic 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 handed out by the lecturer. Fleming, I.: Pericyclic Reactions, Oxford University Press, 2002 and Clayden, J., Greeves, N., Warren, S. ja Wothers, P.: Organic Chemistry, Oxford University Press, 2001, partly.

Assessment methods and criteria:

The students will compile a learning diary all through the course unit, and the learning diary will be assessed. The assessment affects 50%. 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. Marja Lajunen

Working life cooperation:

No

Other information:

No

782631S: Physical Chemistry II, 4 op**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Department of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

780392A Physical Chemistry II 4.0 op

780349A Physical Chemistry II 4.0 op

ECTS Credits:

4 credits/107 hours of work

Language of instruction:

Finnish. English on demand

Timing:

4th autumn. The course is lectured every year.

Learning outcomes:

After completing this course the students should have good knowledge of the basics of quantum mechanics and statistical mechanics and their role in physical chemistry.

Contents:

Basic of quantum mechanics, particle-in-box, hydrogen atoms, LCAO model for molecules. Basics of statistical mechanics, partition function and how to derive statistical properties from it. Ideal and real gases. Diffusion and electrical conductivity.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

36 hours of lectures, 8 hours of assignment exercises, 57 hours of self-study

Target group:

Chemistry, compulsory

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:

P.W. Atkins and J. de Paula, Atkins Physical Chemistry, 8th ed., 2006 (or 7th ed., 2002), Oxford University Press, Chapters 8-11, 16-17, 21.; or 9th or newer ed.

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:

The contents and credits of this course are the same as of the course 780392A Physical Chemistry II. The student can perform only one of them.

783620S: Polymer Chemistry, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Hormi Osmo

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits/80 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th or 5th year. The course is lectured every other year.

Learning outcomes:

After passing the course, the student can explain the most important technical quantities of polymeric materials including the mathematical background of the quantities.

Contents:

Polymer molecular weights, conformation of polymers, the visco-elastic behaviour of polymers, the conduction of heat and electricity in polymers.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

24 hours of lectures, 56 hours of self study

Target group:

Chemistry

Prerequisites and co-requisites:

Introduction to polymer chemistry (780326A)

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:

Elias, H-G: An Introduction to Plastics, VCH, Weinheim, 1993.

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. Osmo Hormi

Working life cooperation:

Ei

Other information:

No

783636S: Polymer Chemistry in Materials Sciences, 3 - 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Hormi Osmo

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits/80 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th or 5th year. The course is lectured every other year, the next time during the spring 2015.

Learning outcomes:

After passing the course the student can explain technical characteristics such as strength, modulus and heat deflection temperature of the most important polymeric materials.

Contents:

Commodity plastics, engineering polymers, carbon fibre, aramid fibres, liquid crystalline polymers, heat stable polymers, epoxy resins.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

24 hours of lectures, 56 hours of self study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Introduction to Polymer Chemistry (780326A/783650S) (recommended)

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:

Flinn, R.A. and Trojan, P.K., Engineering Materials and Their Applications, International Student Edition, Houghton Mifflin Comp., 4th ed., Boston 1990 (partly); Fawcett, A.H. (Editor): High Value Polymers, The Royal Society of Chemistry, Redwood Press Ltd., Melksham, 1991; Engineered Materials handbook, Part 1 and Part 2, ASM International, Metals Park, OH, 1993 (Part 1) and 1988 (Part 2).

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. Osmo Hormi

Working life cooperation:

No

Other information:

No

783634S: Research Seminar in Organic Chemistry, 2 op**Voimassaolo:** 01.08.2012 -**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Department of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**ECTS Credits:**

2 credits/53 hours of work

Language of instruction:

Finnish and English

Timing:

Autumn + spring

Learning outcomes:

After taking part in weekly seminars the student can work in a group, present and report his/her scientific results in Finnish or English for a specialist audience.

Contents:

Design and following of projects in organic chemistry

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Weekly meetings 20 hours, 33 hours of self study

Target group:

Chemistry

Prerequisites and co-requisites:

Organic Chemistry I (780389A)

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 during the seminar

Assessment methods and criteria:

Attendance at seminar and presentation of own research

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

The course utilizes verbal grading scale pass/fail.

Person responsible:

Prof. Marja Lajunen

Working life cooperation:

No

Other information:

No

782623S: Research Seminar in Physical Chemistry, 2 op**Voimassaolo:** 01.08.2012 -**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Department of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Pursiainen Jouni**Opintokohteen kielet:** Finnish**Voidaan suorittaa useasti:** Kyllä

ECTS Credits:

2 credits/53 hours of work

Language of instruction:

Finnish, English on demand.

Timing:

5th Autumn + Spring

Learning outcomes:

Upon completion of the course, student should have acquired knowledge and understanding of recent development in physical chemistry. The student will be familiarized with the practices in international conferences.

Contents:

Seminar in Physical Chemistry, seminar presentations, the student's own seminar talk

Mode of delivery:

Face-to-face teaching, compulsory attendance

Learning activities and teaching methods:

Introductory lecture 2 hours, seminar 12 hours, self-study 39 hours

Target group:

Chemistry

Prerequisites and co-requisites:

Physical Chemistry I

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 during the seminar

Assessment methods and criteria:

The assessment of the course is based on the attendance at the symposium and a seminar presentation.

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

Grading:

The course utilizes verbal grading scale pass/fail.

Person responsible:

Prof. Jouni Pursiainen and Prof. Ulla Lassi

Working life cooperation:

No

Other information:

No

781640S: Sampling and Sample Preparation, 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Paavo Perämäki

Opintokohteen kielet: Finnish

Leikkaavuudet:

781335A Sampling and Sample Preparation 4.0 op

ECTS Credits:

4 credits /107 hours of work

Language of instruction:

Finnish

Timing:

4th or 5th year. The course is lectured every 4th other year, next time during the spring 2015.

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 inorganic analysis.

Contents:

Sampling errors and representative sampling, various sample preparation techniques utilizing open and closed systems and their use in the determination of total element concentrations, element fractionation by sequential extraction.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

24 hours of lectures + seminar presentation + 83 hours of self-study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Introduction to Analytical Chemistry (780111P)

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:

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

781647S: Scanning electron microscopy, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Minna Tiainen

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits/80 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th or 5th spring. The course is lectured every other year.

Learning outcomes:

Upon completion the student should have acquired knowledge and understanding of terminology of microscopy, function of SEM-EDS and applications of SEM-EDS.

Contents:

Basic terminology, Scanning electron microscope and EDS, image formation and processing, applications.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

20 hours of lectures, portfolio 10 hours, essay 10 hours, self-study 40 hours

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Inorganic Chemistry I (780353A)

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:

Goodhew P.J.: Humphreys J. and Beanland R., Electron Microscopy and Analysis, 3rd ed., Taylor & Francis, 2000.

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

788602S: Seminar in Structural Chemistry, 2 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Mattila, Sampo Antero

Opintokohteen kielet: Finnish

ECTS Credits:

2 credits/53 hours of work

Language of instruction:

Finnish/English on demand

Timing:

Spring and autumn

Learning outcomes:

Upon completion the student is capable of searching information in literature and recognizes the newest results in chemistry literature. He/she is able to evaluate critically scientific information, to write a scientific paper on a given subject and to give a presentation on it.

Contents:

Student gives two presentations on a given scientific subject and distributes an abstract to the audience.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

20 hours of seminars, 33 hours of self-study

Target group:

Chemistry, optional

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:

Agreed separately

Assessment methods and criteria:

Attendance at seminars

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

Grading:

The course utilizes verbal grading scale pass/fail.

Person responsible:

Lecturer Sampo Mattila

Working life cooperation:

No

Other information:

No

781611S: Solid State Chemistry, 4 op

Voimassaolo: - 31.07.2015

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Laitinen Risto

Opintokohteen kielet: Finnish

ECTS Credits:

4 credits/107 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th or 5th year. The course is lectured every other year, next time during the autumn 2014.

Learning outcomes:

Knowledge of synthesis, structures, spectroscopic properties, reactions, and applications of solid materials.

Contents:

Preparation of solid materials, structures of solids, crystal defects, thermodynamics and reaction kinetics, the effect of outer conditions on some reactions, phase diagrams and their applications, optical, magnetic and electric properties of solid materials, and industrial applications.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

28 hours of lectures, 99 hours of self-study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Physical Chemistry I (780347A), Inorganic Chemistry I (780353A), and Inorganic Chemistry II (780391A)

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:

West, A. R.: Basic Solid State Chemistry, 2nd Ed., John Wiley & Sons, Norwich, 1989

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:

Prof. Risto Laitinen

Working life cooperation:

No

Other information:

No

781631S: Statistical Methods in Analytical Chemistry, 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Paavo Perämäki

Opintokohteen kielet: Finnish

ECTS Credits:

4 credits /107 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 2013 and 2015.

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 + 10 hours of exercises + 67 hours of self-study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Introduction to Analytical Chemistry (780111P)

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 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

784640S: Structural Chemistry I, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department 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:

Autumn

Learning outcomes:

After this course the student is familiar with the basics of interpretation of IR, NMR and mass spectra.

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

Target group:

Chemistry

Prerequisites and co-requisites:

No specific prerequisites

Recommended optional programme components:

The contents and credits of this course are the same as in the course 780317A Structural Chemistry I. The student can perform this course only once: 780317A Structural Chemistry I or 784640S Structural Chemistry I.

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:

The course 780317A Structural chemistry I is compulsory in the B.Sc. for those students who have started their studies before 1st August 2012.

780317A: Structural Chemistry I, 5 op**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Department of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Mattila, Sampo Antero**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

784640S Structural Chemistry I 5.0 op

ECTS Credits:

5 credits/134 hours of work

Language of instruction:

Finnish

Timing:3rd autumn**Learning outcomes:**

After this course the student is familiar with the basics of interpretation of IR, NMR and mass spectra.

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

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

No specific prerequisites

Recommended optional programme components:

The contents and credits of this course are the same as in the course 784640S Structural Chemistry I. The student can perform this course only once: 780317A Structural Chemistry I or 784640S Structural Chemistry I.

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:

Compulsory in the B.Sc. Degree, if the student has started his/her studies before 1st August 2012.

781614S: Structural Methods in Inorganic Chemistry, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Raija Oilunkaniemi

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits/80 hours of work

Language of instruction:

Finnish, English on demand

Timing:

4th or 5th year. The course is lectured every other year, next time during the autumn 2013.

Learning outcomes:

This course will give the student an overview of the application of multinuclear NMR spectroscopy as one of the instrumental methods for identification and structural characterization of inorganic compounds.

Contents:

Applications of NMR Spectroscopy in inorganic chemistry.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

20 hours of lectures, 16 hours of seminar, 44 hours of self-study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Inorganic Chemistry I (780353A) and Inorganic Chemistry II (780391A)

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 by the lecturer.

Assessment methods and criteria:

The assessment of the course is based on the final examination, attendance at the seminars, and a seminar presentation.

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. Risto Laitinen

Working life cooperation:

No

Other information:

No

782620S: Surface Chemistry I, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Ulla Lassi

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits/80 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th or 5th autumn. The course is lectured every other year.

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.

Contents:

Properties of liquid-gas and liquid-liquid interfaces. 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:

30 hours of lectures, 50 hours of self-study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Physical Chemistry II (782631S)

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:

Adamson, A.W.: Physical Chemistry of Surfaces, 6th ed., John Wiley & Sons, New York, 1997, partly. 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

782633S: Surface chemistry II, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Ulla Lassi

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits/80 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th or 5th spring. The course is lectured every other year.

Learning outcomes:

Upon completion of the course, the student will be able to explain properties of surfaces (solid-gas, solid-liquid) 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 solid-gas and solid-liquid interfaces, Surface structures, Surface phenomena and Surface analytical methods. Heterogeneous catalysis at solid surfaces is studied as an application.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

30 hours of lectures, 50 hours of self-study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Physical Chemistry I (780347A) and Physical Chemistry II (2631S)

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:

Adamson, A.W. : Physical Chemistry of Surfaces, 6th edition, John Wiley and Sons, New York, 1997 (to the appropriate extent); Somorjai, G.A. : Introduction to Surface Chemistry and Catalysis, John Wiley and Sons, New York, 1994 (to the appropriate extent). 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

781630S: Symposium in inorganic and analytical chemistry, 2 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Paavo Perämäki, Laitinen Risto

Opintokohteen kielet: Finnish

ECTS Credits:

2 credits/53 hours of work

Language of instruction:

English

Timing:

4th and 5th year.

Learning outcomes:

Upon completion of the course, student should have acquired knowledge and understanding of recent development in inorganic chemistry and inorganic analytical chemistry. The student will be familiarized with the practices in international conferences.

Contents:

The attendance is compulsory. The student gives one presentation of 20 min on a topic taken from chemical literature.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Introductory lecture 2 hours, symposium 12 hours, self-study 39 hours

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Inorganic Chemistry I, Inorganic Chemistry II, Instrumental Analysis

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 by the lecturer

Assessment methods and criteria:

The assessment of the course is based on the attendance at the symposium and a seminar presentation.

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

Grading:

The course utilizes verbal grading scale pass/fail

Person responsible:

Prof. Risto Laitinen and Prof. Paavo Perämäki

Working life cooperation:

No

Other information:

No

783642S: Synthetic Methods in Green Chemistry, 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Marja Lajunen

Opintokohteen kielet: Finnish

ECTS Credits:

4 credits/107 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th or 5th autumn or spring. The course is lectured every other year, next time during the year 2015.

Learning outcomes:

After this course the student can apply principles of green chemistry to a practical synthetic design. He/she can compare and infer methods, their conditions, atom economy and performance from green chemistry point of view. The student can modify and perform a microwave-assisted reaction and prepare ionic liquids.

Contents:

After this course the student can apply principles of green chemistry to a practical synthetic design. He/she can compare and infer methods, their conditions, atom economy and performance from green chemistry point of view. The student can modify and perform a microwave-assisted reaction and prepare ionic liquids.

Mode of delivery:

Face-to-face teaching, supervised use of microwave reactor, microwave activated synthesis of an ionic liquid

Learning activities and teaching methods:

20 hours of lectures, 2 hours of demonstrations, 85 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:

Material given by the lecturer. Adams, D.J., Dyson, P., Tavener, S.J. Chemistry in Alternative Reaction Media, Wiley, 2004, Chapters 1, 4- 7, 11; Hayes, B.L. Microwave Synthesis, Chemistry at the Speed of Light, CEM Publishing, 2002; Kerton, F.M. Alternative Solvents for Green Chemistry, RSC Publishing, 2009; Freemantle, M. An Introduction to Ionic Liquids, RSC Publishing 2010.

Assessment methods and criteria:

The students will compile a learning diary all through the course unit, and the learning diary will be assessed. The assessment affects 30%. 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. Marja Lajunen

Working life cooperation:

No

Other information:

No

783619S: Wood Chemistry, 3 op**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Department of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Hormi Osmo**Opintokohteen kielet:** Finnish**ECTS Credits:**

3 credits/hours of work

Language of instruction:

Finnish

Timing:

4th or 5th year. The course is lectured every other year, the next time is during the autumn 2014.

Learning outcomes:

After passing the course the student can explain the chemical composition of wood and the chemistry involved in chemical pulping of wood.

Contents:

The structure of wood, chemistry of carbohydrates, polysaccharides of wood, lignin, extractives, bark, pulping chemistry, bleaching.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

24 hours of lectures, 56 hours of self study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Introduction to Organic Chemistry (780103P)

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:

Sjöström, E.: Wood Chemistry: Fundamentals and Applications, Academic Press, New York 1981.

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. Osmo Hormi

Working life cooperation:

No

Other information:

No

781646S: X-Ray Crystallography, 6 op**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Department of Chemistry**Arvostelu:** 1 - 5, pass, fail

Opettajat: Laitinen Risto

Opintokohteen kielet: Finnish

ECTS Credits:

6 credits/160 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th or 5th year. The course is lectured every other year, the next time is during the autumn 2014.

Learning outcomes:

After this course the student is familiar with basic concepts of crystal symmetry, the fundamentals of crystal structure determination, and has some hands-on experience in the structure determination.

Contents:

Crystal classes, crystal symmetry, scattering of X-rays in crystalline material, determination of the crystal structure from single crystals.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

36 hours of lectures, 16 hours of demonstrations, 100 hours of self-study (including practical exercise with a written report)

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Inorganic Chemistry I (780353A), Inorganic Chemistry II (780391A), and Molecular Symmetry and Spectroscopy (781639S)

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:

Massa, W.: Crystal Structure Determination, Springer, Berlin, 2000.

Assessment methods and criteria:

The assessment of the course is based on the final examination and the report of the practical exercise.

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. Risto Laitinen

Working life cooperation:

No

Other information:

No