

Opasraportti

LuTK - Chemistry 2016-2017 (2016 - 2017)

Tutkintorakenteet

M.Sc. Degree in Chemistry (Teacher training)

Tutkintorakenteen tila: archived

Lukuvuosi: 2016-17

Lukuvuoden alkamispäivämäärä: 01.08.2016

Major Studies in Chemistry (vähintään 60 op)

Advanced Studies for All (compulsory)

780699S: Maturity Test, 0 op

Major in Inorganic Chemistry (teacher training) (compulsory)

780683S: Final Examination in Teacher Training, 7 op

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

Major Physical Chemistry (teacher training) (compulsory)

780683S: Final Examination in Teacher Training, 7 op

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

Major Organic Chemistry (teacher training) (compulsory)

780683S: Final Examination in Teacher Training, 7 op

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

Major in Structural Chemistry (teacher training) (compulsory)

780683S: Final Examination in Teacher Training, 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: published

Lukuvuosi: 2016-17

Lukuvuoden alkamispäivämäärä: 01.08.2016

Major Studies in Chemistry (vähintään 105 op)

Advanced Studies in Chemistry for All (compulsory)

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

Major Inorganic Chemistry

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

Major Physical Chemistry

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

Major Organic Chemistry

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

Major Structural Chemistry

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

Optional Advanced Courses in Chemistry (minimum 35 credits)

Optional Studies (vähintään 17 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.

B.Sc. Degree in Chemistry (Teacher training)

Tutkintorakenteen tila: published

Lukuvuosi: 2016-17

Lukuvuoden alkamispäivämäärä: 01.08.2016

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

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

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

Optional courses

780079Y: Tutoring, 1 op

Major Studies in Chemistry (vähintään 88 op)

Basic Studies in Chemistry

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

be

780117P: General and Inorganic Chemistry A, 5 op

780118P: General and Inorganic Chemistry B, 5 op

780116P: Introduction to Organic Chemistry, 5 op

780119P: Introduction to Analytical Chemistry, 5 op

780127P: Introductory Laboratory Works, 5 op

Intermediate Studies in Chemistry (63-65 credits)

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

Compulsory

781301A: Inorganic Chemistry I, 5 op

781302A: Inorganic Chemistry II, 5 op

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

781303A: Physical Chemistry I, 5 op

781304A: Physical Chemistry II, 5 op

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

781305A: Organic Chemistry I, 5 op

781306A: Organic Chemistry II, 5 op

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

780396A: Demonstrations in Physics and Chemistry, 2 op

781320A: Bachelor's Thesis, 9 op

780381A: Maturity test, 0 op

780301A: Research Training, 9 op

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

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

Other subject

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 (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.

B.Sc. Degree in Chemistry (Chemist)

Tutkintorakenteen tila: published

Lukuvuosi: 2016-17

Lukuvuoden alkamispäivämäärä: 01.08.2016

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
 901035Y: Second Official Language (Swedish), Oral Skills, 1 op
 901034Y: Second Official Language (Swedish), Written Skills, 1 op

Optional courses

780079Y: Tutoring, 1 op

Major Studies in Chemistry (vähintään 93 op)

Basic Studies in Chemistry

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

be

780117P: General and Inorganic Chemistry A, 5 op
 780118P: General and Inorganic Chemistry B, 5 op
 780116P: Introduction to Organic Chemistry, 5 op
 780119P: Introduction to Analytical Chemistry, 5 op
 780127P: Introductory Laboratory Works, 5 op

Intermediate Studies in Chemistry

A325202: Chemistry, Intermediate Studies, 63 - 105 op

ad

781301A: Inorganic Chemistry I, 5 op
 781302A: Inorganic Chemistry II, 5 op
 780354A: Laboratory Course I in Inorganic Chemistry, 5 op
 781303A: Physical Chemistry I, 5 op
 781304A: Physical Chemistry II, 5 op
 780331A: Laboratory Course I in Physical Chemistry, 5 op
 781305A: Organic Chemistry I, 5 op
 781306A: Organic Chemistry II, 5 op
 781307A: Laboratory Course I in Organic Chemistry, 5 op
 781308A: Instrumental Analysis, 5 op
 780301A: Research Training, 9 op
 781320A: Bachelor's Thesis, 9 op
 780381A: Maturity test, 0 op

Minor Studies (vähintään 50 op)

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

Mathematics

802161P: Introduction to Real Functions, 5 op

Basic Studies in Physics 25 credits

Process Engineering (optional)

477011P: Introduction to Process and Environmental Engineering I, 5 op
 488010P: Introduction to Process and Environmental Engineering II, 5 op

Biochemistry (optional)

Biology (optional)

750121P: Cell biology, 5 op

Basic and Intermediate Studies of Physics (60 credits entity)

766101P: Mathematics for physics, 5 op

Geology (optional)

771102P: Basic course in mineralogy, 6 op

771113P: Introduction to Geology I, 5 op

771114P: Introduction to Geology II, 5 op

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

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

Other Minor 1 (optional)

Other Minor 2 (optional)

Optional Studies (vähintään 30 op)

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

Some Instructions for Making the Personal Study Plan

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

Tutkintorakenteisiin kuulumattomat opintokokonaisuudet ja -jaksot

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

781650S: Atomic Spectrometric Techniques, 5 op

781321A: Bachelor's Thesis, 8 op

780109P: Basic Principles in Chemistry, 4 op

780120P: Basic Principles in Chemistry, 5 op

780372A: Basic Principles of Green Chemistry, 4 op

782641S: Catalysis, 5 op

780681S: Chemical Legislation in Finland, 1 op

780321A: Chemical Legislation in Finland, 1 op

780395A: Chemistry for Teachers, 4 op

782638S: Chemistry in Industrial Applications, 5 op

782640S: Chemistry of Hydrometallurgical Processes, 5 op

782639S: Electrochemistry, 5 op

781309A: Environmental Chemistry, 5 op

781657S: Experimental Design, 5 op

781600S: Final Examination in Inorganic Chemistry, 7 op

780683S-01: Final Examination in Inorganic Chemistry (Teacher), 0 op

783600S: Final Examination in Organic Chemistry, 7 op

780683S-03: Final Examination in Organic Chemistry (Teacher), 0 op

782600S: Final Examination in Physical Chemistry, 7 op

780683S-02: Final Examination in Physical Chemistry (Teacher), 0 op

784600S: Final Examination in Structural Chemistry, 7 op
 780683S-04: Final Examination in Structural Chemistry (Teacher), 0 op
 780114P: General and Inorganic Chemistry I, 6 op
 780115P: General and Inorganic Chemistry II, 6 op
 780341A: Industrial Training I, 2 op
 780342A: Industrial Training II, 4 op
 780343A: Industrial Training III, 6 op
 780344A: Industrial Training IV, 8 op
 780353A: Inorganic Chemistry I, 6 op
 780391A: Inorganic Chemistry II, 4 op
 781642S: Inorganic Chemistry II, 4 op
 781648S: Inorganic Structural Chemistry, 5 op
 780328A: Instrumental Analysis, 4 - 5 op
 780111P: Introduction to Analytical Chemistry, 4 op
 780103P: Introduction to Organic Chemistry, 6 op
 780112P: Introduction to Organic Chemistry, 4 op
 780122P: Introductory Laboratory Course in Chemistry, 3 op
 780123P: Introductory Laboratory Works in Chemistry, 5 op
 780330A: Laboratory Course I in Inorganic Chemistry, 7 op
 780330A-01: Laboratory Course I in Inorganic Chemistry (1. part), 2 op
 780330A-02: Laboratory Course I in Inorganic Chemistry (2. part), 5 op
 780379A: Literature of Chemistry and Communication Skills, 2 op
 781627S: Main Group Chemistry, 5 op
 781651S: Metrological Fundamentals of Analytical Chemistry, 5 op
 784641S: NMR-workshop I, 5 op
 784642S: NMR-workshop II, 5 op
 780389A: Organic Chemistry I, 6 op
 780393A: Organic Chemistry II, 4 op
 783643S: Organic Chemistry II, 4 op
 783639S: Organic Chemistry III, 5 op
 780347A: Physical Chemistry I, 6 op
 782631S: Physical Chemistry II, 4 op
 780392A: Physical Chemistry II, 4 op
 782623S: Research Seminar in Physical Chemistry, 2 op
 780301A-01: Research Training, 3 op
 780301A-03: Research Training, 3 op
 780301A-02: Research Training, 3 op
 781649S: Sampling and Sample Pretreatment, 5 op
 780380A: Seminar for the Degree of B.Sc., 1 op
 781652S: Solid State Chemistry, 5 op
 784640S: Structural Chemistry I, 5 op
 781658S: Surface Analytical Techniques, 5 op
 782637S: Surface Chemistry, 5 op
 780300A: Thesis for the Degree of B.Sc., 6 op
 781655S: X-Ray Crystallography, 5 op

Opintojaksojen kuvaukset

Tutkintorakenteisiin kuuluvien opintokohteiden kuvaukset

780699S: Maturity Test, 0 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

0 credits/ 2 hours of work

Language of instruction:

Finnish, 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

780683S: Final Examination in Teacher Training, 7 op

Voimassaolo: 01.01.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

7 credits/ 187 hours of work

Language of instruction:

Finnish

Timing:

5th 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:

Teachers, compulsory

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:

The students of teacher training line take final examinations in two majors (3,5 cr each). The textbooks are:

Inorganic Chemistry. Cotton, F. A., Wilkinson, G. ja Gaus, P. L.: Basic Inorganic Chemistry, 3. painos, Wiley & Sons, 1995.

Physical Chemistry. Atkins P. and De Paula, J., Atkins' Physical Chemistry, Oxford University Press, Oxford, 9.

painos (2009) tai uudempi.

Organic Chemistry. Clayden, J., Greeves, N., Warren, S. ja Wothers, P.: Organic Chemistry, Oxford University Press, 2. painos, 2012., (valituin osin).

Structural Chemistry. By separate agreement.

Assessment methods and criteria:

1 Final examination/major

Grading:

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

Person responsible:

Professors

Working life cooperation:

No

Other information:

No

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

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

20 credits/534 hours of work

Language of instruction:

Finnish, English on demand

Timing:

5th autumn, beginning

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.

780683S: Final Examination in Teacher Training, 7 op

Voimassaolo: 01.01.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

7 credits/ 187 hours of work

Language of instruction:

Finnish

Timing:

5th 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:

Teachers, compulsory

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:

The students of teacher training line take final examinations in two majors (3,5 cr each). The textbooks are:

Inorganic Chemistry. Cotton, F. A., Wilkinson, G. ja Gaus, P. L.: Basic Inorganic Chemistry, 3. painos, Wiley & Sons, 1995.

Physical Chemistry. Atkins P. and De Paula, J., Atkins' Physical Chemistry, Oxford University Press, Oxford, 9. painos (2009) tai uudempi.

Organic Chemistry. Clayden, J., Greeves, N., Warren, S. ja Wothers, P.: Organic Chemistry, Oxford University Press, 2. painos, 2012., (valituin osin).

Structural Chemistry. By separate agreement.

Assessment methods and criteria:

1 Final examination/major

Grading:

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

Person responsible:

Professors

Working life cooperation:

No

Other information:

No

782602S: Master's Thesis in Physical Chemistry, 20 op**Opiskelumuoto:** Advanced Studies**Laji:** Diploma thesis**Vastuuyksikkö:** Field of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**ECTS Credits:**

20 credits/534 hours of work

Language of instruction:

Finnish, English on demand

Timing:

5th autumn, beginning

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.

780683S: Final Examination in Teacher Training, 7 op**Voimassaolo:** 01.01.2015 -**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Field of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**ECTS Credits:**

7 credits/ 187 hours of work

Language of instruction:

Finnish

Timing:

5th 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:

Teachers, compulsory

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:

The students of teacher training line take final examinations in two majors (3,5 cr each). The textbooks are:

Inorganic Chemistry. Cotton, F. A., Wilkinson, G. ja Gaus, P. L.: Basic Inorganic Chemistry, 3. painos, Wiley & Sons, 1995.

Physical Chemistry. Atkins P. and De Paula, J., Atkins' Physical Chemistry, Oxford University Press, Oxford, 9. painos (2009) tai uudempi.

Organic Chemistry. Clayden, J., Greeves, N., Warren, S. ja Wothers, P.: Organic Chemistry, Oxford University Press, 2. painos, 2012., (valituin osin).

Structural Chemistry. By separate agreement.

Assessment methods and criteria:

1 Final examination/major

Grading:

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

Person responsible:

Professors

Working life cooperation:

No

Other information:

No

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

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

20 credits/534 hours of work

Language of instruction:

Finnish, English on demand

Timing:

5th autumn, beginning

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.

780683S: Final Examination in Teacher Training, 7 op

Voimassaolo: 01.01.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

7 credits/ 187 hours of work

Language of instruction:

Finnish

Timing:

5th 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:

Teachers, compulsory

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:

The students of teacher training line take final examinations in two majors (3,5 cr each). The textbooks are:

Inorganic Chemistry. Cotton, F. A., Wilkinson, G. ja Gaus, P. L.: Basic Inorganic Chemistry, 3. painos, Wiley & Sons, 1995.

Physical Chemistry. Atkins P. and De Paula, J., Atkins' Physical Chemistry, Oxford University Press, Oxford, 9. painos (2009) tai uudempi.

Organic Chemistry. Clayden, J., Greeves, N., Warren, S. ja Wothers, P.: Organic Chemistry, Oxford University Press, 2. painos, 2012., (valituin osin).

Structural Chemistry. By separate agreement.

Assessment methods and criteria:

1 Final examination/major

Grading:

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

Person responsible:

Professors

Working life cooperation:

No

Other information:

No

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

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

20 credits/534 hours of work

Language of instruction:

Finnish, English on demand

Timing:

5th autumn, beginning

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:

Sari Eskola, Hellevi Kupila and Emilia Manninen

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:

Sari Eskola, Hellevi Kupila and Emilia Manninen

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:

Raimo Kaasila and 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, exam on Takala, M. (2010) Erityispedagogiikka ja kouluikä.

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:

Takala, M. (2010) Erytispedagogiikka ja kouluikä.

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

780699S: Maturity Test, 0 op**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Field of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**Voidaan suorittaa useasti:** Kyllä**ECTS Credits:**

0 credits/ 2 hours of work

Language of instruction:

Finnish, 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: Field 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 work including laboratory research and a report.

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

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

Laboratory research and a report

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

Grading:

The course utilizes verbal grading scale pass/fail.

Person responsible:

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: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits/80 hours of work

Language of instruction:

Finnish, English on demand

Timing:

5th spring

Learning outcomes:

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.

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

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

20 credits/534 hours of work

Language of instruction:

Finnish, English on demand

Timing:

5th autumn, beginning

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: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

30 credits/ 801 hours of work

Language of instruction:

Finnish/English on the demand

Timing:

5th Autumn (beginning)

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

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

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

20 credits/534 hours of work

Language of instruction:

Finnish, English on demand

Timing:

5th autumn, beginning

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.

782607S: Research Project in Physical Chemistry, 30 op

Voimassaolo: 01.08.2013 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

30 credits/ 801 hours of work

Language of instruction:

Finnish/English on the demand

Timing:

5th Autumn, beginning

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 + 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

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

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

20 credits/534 hours of work

Language of instruction:

Finnish, English on demand

Timing:

5th autumn, beginning

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: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

30 credits/ 801 hours of work

Language of instruction:

Finnish/English on demand

Timing:

5th Autumn, beginning

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

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

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

20 credits/534 hours of work

Language of instruction:

Finnish, English on demand

Timing:

5th autumn, beginning

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: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

30 credits/ 801 hours of work

Language of instruction:

Finnish/English on demand

Timing:

5th Autumn, beginning

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 (784602S 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, Lecturers, Doctor level researchers of the Chemistry Department

Working life cooperation:

No

Other information:

No

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

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Proficiency level:

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

Status:

This course is mandatory for students of the following degree programmes:

Faculty of Science

- Biology
- Chemistry
- Mathematical Sciences
- Physics

Oulu Mining School

- Geosciences degree programme

Faculty of Information Technology and Electrical Engineering

- Department of Information Processing Science

Students in the Department of Geography take English 3.

Engineering students in the following programmes take their English courses in the Faculty of Technology:

Oulu Mining School:

- Mining Technology and Mineral Processing degree programme

Faculty of Information Technology and Electrical Engineering

- Department of Electrical Engineering
- Department of Communications Engineering
- Department of Computer Science and Engineering

Please consult the Faculty Study Guide to establish the language requirements for your own degree program.

Required proficiency level:

English must have been the A1 or A2 language at school or equivalent English skills should have been acquired otherwise.

ECTS Credits:

2 ECTS 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 (pedagogy): 1st year spring term

Mathematical Sciences: 2nd year autumn term

Physical Sciences: 1st year autumn term

Learning outcomes:

By the end of the course, you are expected to be able to

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

Contents:

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

Mode of delivery:

Contact teaching

Learning activities and teaching methods:

The scope of the course is 2 op (54 hours student workload).

Target group:

1st year students of Biology, Chemistry, Geology, Information Processing Science, Physics, and Mathematics (pedagogy); 2nd year students of Mathematics

Prerequisites and co-requisites:

-

Recommended optional programme components:

Students are also required to take 902004Y Scientific Communication, which is taken AFTER completion of this course.

Recommended or required reading:

Photocopies will be provided by the teacher and/or required texts will be accessible online or from the university library.

Assessment methods and criteria:

Student work is monitored by continuous assessment. You are required to participate regularly and actively in all contact teaching provided, and successfully complete all required coursework. There will be three monthly tests on material covered so far.

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

Grading:

Pass/Fail

Person responsible:

Karen Niskanen

Working life cooperation:

-

Other information:

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

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

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Leikkaavuudet:

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

Proficiency level:

B2/C1 on the 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 demonstrated your use of appropriate strategies and techniques for communicating effectively in English in an academic context.
2. to have demonstrated the ability to prepare and present scientific subjects to your classmates, using appropriate field-related vocabulary.

Contents:

Skills in listening, speaking, and presenting academic topics are practised in the classroom, where there is an emphasis on working in pairs and small groups. Homework tasks include online lecture listening and reading, preparation for classroom discussions and written work to support the classroom learning.

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.

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:

Karen Niskanen

Working life cooperation:

-

Other information:

-

780078Y: Orientation Course for New Students, 1 op

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Matti Niemelä

Opintokohteen kielet: Finnish

ECTS Credits:

1 credits/27 hours of work

Language of instruction:

Finnish

Timing:

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:

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.

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

Voimassaolo: 01.08.2014 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Opintokohteen kielet: Swedish

Leikkaavuudet:

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

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

Voimassaolo: 01.08.2014 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Opintokohteen kielet: Swedish

Leikkaavuudet:

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

780079Y: Tutoring, 1 op

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: 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: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

Ei opintojaksokuvauksia.

be

780117P: General and Inorganic Chemistry A, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

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

5 credits /134 hours of work

Language of instruction:

Finnish

Timing:

1st 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, chemical equilibrium, acids and bases, additional aspects of acid-base equilibria, solubility and complex-ion equilibria.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

32 hours of lectures and applications, 20 hours of exercises and 82 hours of self-study

Target group:

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

Prerequisites and co-requisites:

Upper secondary school chemistry

Recommended optional programme components:

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

Recommended or required reading:

Petrucci, R.H., Herring, F.G., Madura, J.D. ja Bissonnette, C.: General Chemistry: Principles and Modern Applications, 10. edition (also 7., 8. and 9. edition), Pearson Canada Inc., Toronto, 2011. Chapters 1 – 6, 15 – 18.

Assessment methods and criteria:

Two intermediate examinations or one final examination. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

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

Person responsible:

N.N.

Working life cooperation:

No

Other information:

No

780118P: General and Inorganic Chemistry B, 5 op**Voimassaolo:** 01.08.2015 -**Opiskelumuoto:** Basic Studies**Laji:** Course**Vastuuyksikkö:** Field of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

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

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

Finnish

Timing:

1st autumn

Learning outcomes:

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

Contents:

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

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

36 hours of lectures and applications, 22 hours of exercises, 82 hours of self-study

Target group:

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

Prerequisites and co-requisites:

Upper secondary school chemistry

Recommended optional programme components:

-

Recommended or required reading:

Petrucci, R.H., Herring, F.G., Madura, J.D. ja Bissonnette, C.: General Chemistry: Principles and Modern Applications, 10. edition (also 7., 8. and 9. edition), Pearson Canada Inc., Toronto, 2011. Chapters 7 – 12.1, 12.5 – 12.7, 14, 19 – 20.

Assessment methods and criteria:

Two intermediate examinations or one final examination. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

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

Person responsible:

N.N.

Working life cooperation:

No

Other information:

No

780116P: Introduction to Organic Chemistry, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

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

ECTS Credits:

5 credits / 134 hours of work

Language of instruction:

Finnish. Book-examination in English as well.

Timing:

1st autumn and 1st spring

Learning outcomes:

After this course, the student can explain organic chemistry fundamentals, basic concepts and terminology, can use them for the 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.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

40 hours of lectures plus 10 hours of exercises, 80 hours of independent self-study

Target group:

Biochemistry, Chemistry, Biology, Process Engineering, Environmental Engineering and in the study entity of 25 credits, compulsory.

Physical Sciences, Geology, Geography, Mathematical Sciences, optional.

Prerequisites and co-requisites:

Upper secondary school chemistry

Recommended optional programme components:

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

Recommended or required reading:

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

Assessment methods and criteria:

Two intermediate examinations or one final examination.

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

Grading:

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

Person responsible:

Dr. Johanna Kärkkäinen

Working life cooperation:

No

Other information:

No

780119P: Introduction to Analytical Chemistry, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

780111P Introduction to Analytical Chemistry 4.0 op

780110P Analytical Chemistry I 5.5 op

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

Finnish

Timing:

2nd autumn

Learning outcomes:

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

Contents:

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

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

30 hours of lectures + 20 hours of exercises + 83 hours of self-study

Target group:

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

Prerequisites and co-requisites:

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

Recommended optional programme components:

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

Recommended or required reading:

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

Assessment methods and criteria:

Two intermediate examinations or one final examination. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

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

Person responsible:

Prof. Paavo Perämäki

Working life cooperation:

No

Other information:

No

780127P: Introductory Laboratory Works, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

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

ECTS Credits:

5 credits/134 hours of work

Language of instruction:

Finnish

Timing:

1st spring

Learning outcomes:

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

Contents:

Laboratory safety, basic laboratory equipment, basic chemistry techniques and determination methods as well as some of their theoretical background, keeping a laboratory notebook, writing reports.

Mode of delivery:

Supervised laboratory work, independently done preparatory problems.

Learning activities and teaching methods:

Safety in laboratory 2 hours, 65 hours of laboratory work + demonstrations + problems, 67 hours of self-study.

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

General and Inorganic Chemistry A (780117P, 5 cr) and Introduction to Organic Chemistry (780116P, 5 cr). Student is allowed to participate to the course simultaneously when participating the prerequisites. Attendance at the lecture of Safety in laboratory is compulsory.

Recommended optional programme components:

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

Recommended or required reading:

Instruction Book (in Finnish): Kemian perustyöt 780127P

Assessment methods and criteria:

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

Grading:

The course utilizes verbal grading scale pass/fail.

Person responsible:

Ph.D. Teija Kangas

Working life cooperation:

No

Other information:

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

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

Opiskelumuoto: Intermediate Studies

Laji: Study module

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

Compulsory

781301A: Inorganic Chemistry I, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

780353A Inorganic Chemistry I 6.0 op

780356A Inorganic Chemistry 9.0 op

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

Finnish

Timing:

2nd spring

Learning outcomes:

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

Contents:

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

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

38 hours of lectures, 4 hours of exercises, self-study 92 hours

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

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

Recommended optional programme components:

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

Recommended or required reading:

Weller, M., Overton, T., Rourke, J., and Armstrong, F.: Inorganic Chemistry, 6th ed., Oxford University Press, Oxford 2014. Chapters 1-4, 6, 8.

Assessment methods and criteria:

The assessment of the course is based on the final examination. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

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

Person responsible:

Doc. Raija Oilunkaniemi

Working life cooperation:

No

Other information:

No

781302A: Inorganic Chemistry II, 5 op**Voimassaolo:** 01.08.2015 -**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Field of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Raija Oilunkaniemi**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

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

ECTS Credits:

5 credits / 134 hours of work

Language of instruction:

Finnish/English on demand

Timing:

2nd spring

Learning outcomes:

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

Contents:

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

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

32 hours of lecture, 4 hours of exercises, self-study 98 hours

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

Inorganic Chemistry I (781301A) lectures

Recommended optional programme components:

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

Recommended or required reading:

Weller, M., Overton, T., Rourke, J., and Armstrong, F.: Inorganic Chemistry, 6th ed., Oxford University Press, Oxford 2014. Chapters 5, 7, 8, 19-27.

Assessment methods and criteria:

The assessment of the course is based on the final examination.
Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

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

Person responsible:

Raija Oilunkaniemi

Working life cooperation:

No

Other information:

No

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

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

5 credits/ 134 hours of work

Language of instruction:

Finnish

Timing:

2nd spring

Learning outcomes:

At the end of the course, the students should have acquired an understanding of basic qualitative inorganic chemistry, classical quantitative inorganic chemistry 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, 45 hours of work reports + final examination, 9 hours of self-study.

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

General and Inorganic Chemistry a and b (780117P and 780118P), Introduction to Organic Chemistry (780103P or 780112P or 780116P). Introductory Laboratory Course in Chemistry (780122P or 780123P)

Recommended optional programme components:

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

Recommended or required reading:

Material handed out in the laboratory

Assessment methods and criteria:

Works, reports and the final exam passed. The works must be done within the next two years. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail. 75 % laboratory work and 25 % final examination.

Person responsible:

PhD Matti Niemelä

Working life cooperation:

No

Other information:

Reports must be returned to the teaching assistants by the given deadline. Otherwise you have to do the work again.

781303A: Physical Chemistry I, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

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

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

Finnish

Timing:

1st spring

Learning outcomes:

Upon completion the student should be able to display an understanding of the main topics of chemical thermodynamics and kinetics. During the course such concepts are introduced that are needed for the discussion of equilibria in chemistry. Much emphasis is in enthalpy, entropy and Gibbs energy. A unified view of equilibrium and the directions of spontaneous change are obtained in terms of chemical potentials of substances.

Contents:

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

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

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

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

General and Inorganic Chemistry A (780117P) and General and Inorganic Chemistry B (780118P) or General and Inorganic Chemistry I (780114P) and General and Inorganic Chemistry II (780115P) or Introduction to Chemistry (780113P) or Introduction to Physical Chemistry (780101P) and Introduction to Inorganic Chemistry (780102P); or Basic Principles in Chemistry(780109P).

Recommended optional programme components:

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

Recommended or required reading:

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

Assessment methods and criteria:

Two intermediate examinations or one final examination Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

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

Person responsible:

Prof. Jouni Pursiainen

Working life cooperation:

No

Other information:

No

781304A: Physical Chemistry II, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

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

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

Finnish

Timing:

2nd autumn, lectured annually

Learning outcomes:

After completing this course, the student has a good knowledge about the basics of quantum mechanics, especially in atoms and small molecules, and can apply it in simple problems. In addition, the student will learn the basics of statistical mechanics and molecular motion and how they can be used to connect the microscopic atomistic phenomena to the macroscopic thermodynamic quantities, such as pressure and heat capacity etc. Student will also learn the basics of molecular motions in gases and liquids as well as kinetics and mechanisms of chemical reactions.

Contents:

Basics of quantum mechanics, electronic structure of atoms and simple molecules, statistical mechanics and its connection to thermodynamics and molecular motion, molecular motions in gases and liquids, and chemical kinetics and reaction mechanisms.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

44 hours of lectures + 12 hours of exercises, self-study 78 hours

Target group:

Chemistry, chemistry teachers, compulsory

Prerequisites and co-requisites:

Physical Chemistry I (780347A or 781303A), Mathematics for physics (763101P) or the corresponding knowledge

Recommended optional programme components:

The course is 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, 10th ed., 2014, Oxford University Press, Chapters 7-10, 12-14. Similar chapters in 8th and 9th editions also suffice.

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:

Professor Risto Laitinen

Working life cooperation:

No

Other information:

No

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

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Anne Heponiemi

Opintokohteen kielet: Finnish

ECTS Credits:

5 credits/134 hours of work

Language of instruction:

Finnish

Timing:

2nd autumn

Learning outcomes:

Upon completion of the course, the student should have acquired knowledge and understanding of basic experimental methods of physical chemistry which are learned in theory in the course Physical Chemistry I.

Contents:

Calorimetric studies, distribution law, vapour pressure of solvent, partial mole volume, distillation of a mixture of liquids, crystallization of a liquid mixture, potentiometric acid-base titration, absorption, electromotive force.

Mode of delivery:

Face-to-face teaching. The course contains guided laboratory works which include independently written laboratory reports from the works.

Learning activities and teaching methods:

2 hours of lectures of safety at work (obligatory), 68 hours of laboratory experiments. Additionally, written laboratory reports, one per laboratory work, 64 hours

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

Courses General and Inorganic Chemistry A (780117P) and General and Inorganic Chemistry B (780118P) OR Courses General and Inorganic Chemistry I (780114P) and General and Inorganic Chemistry II (780115P), or Introduction to Chemistry (780113P), and Introductory Laboratory Works in Chemistry (780122P or 780123P) 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:

Practical work handout; Atkins, P. W.: Physical Chemistry, 8th ed., Oxford University Press, 2006, partly. Or a newer edition.

Assessment methods and criteria:

Preliminary plan of laboratory work, 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. Anne Heponiemi

Working life cooperation:

No

Other information:

Reports must be returned to the teachers by the given deadline. Otherwise the work have to be done again.

781305A: Organic Chemistry I, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

780389A Organic Chemistry I 6.0 op

780385A Organic Chemistry I 9.0 op

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

Finnish

Timing:

2nd autumn

Learning outcomes:

After passing the course the student can explain the basics in molecular orbitals in simple organic compounds such as ethane, details in nucleophilic substitution, conformation and the basics in stereochemistry of organic compounds.

Contents:

Including molecular orbitals in organic compounds, conformation theory, nucleophilic substitution and basics of stereochemistry.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

40 hours of lectures, 94 hours self study

Target group:

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

Prerequisites and co-requisites:

Introduction to Organic Chemistry (780103P or 780116P) and the courses General and Inorganic Chemistry A (780117P) and General and Inorganic Chemistry B (780118P); or the courses General and Inorganic Chemistry I (780114P) and General and Inorganic Chemistry II (780115P); OR Introduction to Chemistry (780113P) or Introduction to Physical Chemistry (780101P).

Recommended optional programme components:

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

Recommended or required reading:

Clayden, J., Greeves, N., Warren, S., Wothers, P.: Organic Chemistry, Oxford University Press, 2001 and Clayden, J., Greeves, N., Warren, S.: Organic Chemistry, Oxford University Press, 2nd Edition, 2012.

Assessment methods and criteria:

Two intermediate examinations or one final examination Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

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

Person responsible:

N.N.

Working life cooperation:

No

Other information:

No

781306A: Organic Chemistry II, 5 op**Voimassaolo:** 01.08.2015 -**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Field of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

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

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

Finnish/English on demand

Timing:

2nd spring

Learning outcomes:

After this course, the student can profoundly explain and analyze mechanisms of various organic chemistry reactions and predict reaction outcome.

Contents:

Eliminations, addition to alkenes, Diels-Alder reactions, chemistry of aromatic heterocycles, formation of enols and enolates and their reactions.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

38 hours of lectures, 96 hours of self study

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

Organic Chemistry I (781305A)

Recommended optional programme components:

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

Recommended or required reading:

Lecture material and Clayden, J., Greeves, N., Warren, S., Wothers, P.: Organic Chemistry, Oxford University Press, 2001 and Clayden, J., Greeves, N., Warren, S.: Organic Chemistry, 2nd edition, Oxford University Press, 2012.

Assessment methods and criteria:

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

Grading:

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

Person responsible:

PhD Juha Heiskanen

Working life cooperation:

No

Other information:

No

781307A: Laboratory Course I in Organic Chemistry, 5 op**Voimassaolo:** 01.08.2015 -**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Field of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

780329A Laboratory Course I in Organic Chemistry 4.0 op

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

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

Timing:

2nd autumn

Learning outcomes:

Upon completion of the five different syntheses of the course, the student is familiar with safety issues, glassware and equipment, use of laboratory notebook and reporting of laboratory experiments. He/she should be able to work by using basic techniques of organic chemistry such as distillation, extraction, crystallization, TLC.

Contents:

Five different organic syntheses.

Mode of delivery:

Face-to-face teaching in the laboratory

Learning activities and teaching methods:

4 h lectures (obligatory for all), 52h laboratory of supervised, independent laboratory work and 78 h self-study and reporting.

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

General and Inorganic Chemistry A and General and Inorganic Chemistry B (780117P and 780118P), Introduction to Organic Chemistry (780116P), and Introductory Laboratory Course (780123P/780127P) passed.

Or General and Inorganic Chemistry I and General and Inorganic Chemistry II (780114P and 780115P), or Introduction to Chemistry (780113P) or Introduction to Physical Chemistry (780101P) and Introduction to Inorganic Chemistry (780102P) or Basic Principles in Chemistry (780109P), Introduction to Organic Chemistry (780103P), and Introductory Laboratory Course (780122P or 780123P) passed.

Recommended optional programme components:

Participation in the course 781305A Organic Chemistry I.

Recommended or required reading:

Laboratory Course Manual. Clayden, J., Greeves, N., Warren, S., and Wothers, P.: Organic Chemistry, Oxford University Press, 2001 or Clayden, J., Greeves, N., Warren, S.: Organic Chemistry, Oxford University Press, 2nd edition, 2012.

Assessment methods and criteria:

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.

Person responsible:

PhD 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.

780396A: Demonstrations in Physics and Chemistry, 2 op**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Field of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Leena Kaila**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

766309A Demonstrations in Physics and Chemistry 2.0 op

ECTS Credits:

2 credits / 53 hours of work

Language of instruction:

Finnish

Timing:

3rd year

Learning outcomes:

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

Contents:

Demonstrations and laboratory experiments in physics and chemistry.

Mode of delivery:

Face-to-face teaching, compulsory

Learning activities and teaching methods:

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

Target group:

Obligatory in pedagogical studies

Prerequisites and co-requisites:

No specific prerequisites

Recommended optional programme components:

To be done with the teachers pedagogical studies.

Recommended or required reading:

Material handed out during the course

Assessment methods and criteria:

Compulsory teaching and learning diary passed.

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

Grading:

The course utilizes verbal grading scale pass/fail.

Person responsible:

Professor Ulla Lassi

Working life cooperation:

No

Other information:

No

781320A: Bachelor's Thesis, 9 op**Voimassaolo:** 01.08.2015 -**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Field of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

780379A Literature of Chemistry and Communication Skills 2.0 op

780380A Seminar for the Degree of B.Sc. 1.0 op

780300A Thesis for the Degree of B.Sc. 6.0 op

ECTS Credits:

9 credits /240 hours of work

Language of instruction:

Finnish, English on demand

Timing:

3rd autumn and 3rd spring

Learning outcomes:

After this course, the student can search scientific information from the chemistry literature using computer-assisted search methods. He/she can estimate, structure and apply the information while writing a scientific report as well as preparing a poster and oral presentation. The student can adapt the principles of the oral presentation for a talk and apply ethical principles for research and reporting. The student can work in a group, present a poster or give a scientific talk for an audience.

Contents:

Chemistry literature, guidelines for good scientific practice and scientific writing. Use of SciFinder search program in the information retrieval. Preparation and presentation of a poster and seminar talk from the subject, which is related to the Bachelor's thesis. The structure, content and preparation of the Bachelor's thesis.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

10 h of the lectures, 6 h of the demonstrations of the search program and exercises, a poster seminar (3 h), 6 h of the group meetings due to the preparation of candidate's thesis and a course Information Search (8 h). The attendance in the seminar talks of the fellow students and the student's own scientific presentation on a scientific subject related to the B.Sc. thesis (20 min.) during a spring term.

Target group:

Chemistry, Chemistry subject teacher, compulsory

Prerequisites and co-requisites:

The first and second year courses in Chemistry.

Recommended optional programme components:

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

Recommended or required reading:

Lecture handout

Assessment methods and criteria:

The preparation and introduction of a poster. The thesis of ca. 20-40 pages including ca. 30 references. The student gives a scientific presentation (20 min). The compulsory attendance at the lectures, demonstrations, group meetings and seminars. The analysis of the student's own and fellow students'

seminar talks. In addition, the student takes a maturity examination on the subject of the B.Sc. thesis. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

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

Person responsible:

Lecturer Johanna Kärkkäinen, Lecturer Minna Tiainen and Science and Technology Library Tellus. The Bachelor's thesis is supervised by Professors, Docents, University Lectures or Post-doctoral Researchers.

Working life cooperation:

No

Other information:

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

780381A: Maturity test, 0 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

0 credits/2 hours of work

Language of instruction:

Finnish (Swedish or English)

Timing:

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

780301A: Research Training, 9 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field 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: Conductivity of an electrolytic solution, adsorption of solution, rate of chemical reaction, and practical modelling work and report done in the NMR research group of Physics.
in Organic Chemistry: Three different syntheses and qualitative analysis of a mixture of three unknown compounds. Written laboratory report from each practical. Written laboratory report from each practical. Additionally, written laboratory reports, one per practical.

Mode of delivery:

Supervised laboratory works

Learning activities and teaching methods:

240 hours of laboratory works and reports (80 h/laboratory). See more detailed information from description each of module 780301A-01, 780301A-02, and 780301A-03.

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

The compulsory courses of chemistry in the first and second year.

Recommended optional programme components:

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

Recommended or required reading:

In Inorganic Chemistry: Material handed out in the laboratory, in Physical Chemistry: Practical work handout. Atkins, P.W. Physical Chemistry, 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.

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. (2014 or newer prints) Systemaattinen johdatus kasvatustieteeseen. Peruskäsitteet ja pääsuuntauokset. Vastapaino.

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:

Sari Eskola, Hellevi Kupila and Emilia Manninen

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

Outi Toropainen

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 (2016 or 2015) 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:

Teemu Suorsa

Working life cooperation:

No

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

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 6 h, exercises 18h . Independent work 59 h.

Target group:

Secondary math/ Science teacher students doing Bachelor studies

Prerequisites and co-requisites:

No

Recommended optional programme components:

Pedagogical studies for teachers

Recommended or required reading:

To be told in the beginning of the course

Assessment methods and criteria:

Participation in exercise groups, group assignments

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

Grading:

Pass/fail

Person responsible:

Sari Harmoinen ja Anne Pellikka

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 6 h, small group teaching 18h. Independent work 59 h.

Target group:

Secondary teacher students doing Bachelor studies (mathematics and science)

Prerequisites and co-requisites:

050114A Subject Didactics I/Mathematics and Science

Recommended optional programme components:

Pedagogical studies for teachers

Recommended or required reading:

To be told in the beginning of the course

Assessment methods and criteria:

Participation in exercise groups, group assignments

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

Grading:

Pass/fail

Person responsible:

Sari Harmoinen ja Anne Pellikka

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:

Sari Harmoinen, Pekka Vaaraniemi, Katja Leinonen ja Eero Ijäs

Working life cooperation:

No

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

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Proficiency level:

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

Status:

This course is mandatory for students of the following degree programmes:

Faculty of Science

- Biology
- Chemistry
- Mathematical Sciences
- Physics

Oulu Mining School

- Geosciences degree programme

Faculty of Information Technology and Electrical Engineering

- Department of Information Processing Science

Students in the Department of Geography take English 3.

Engineering students in the following programmes take their English courses in the Faculty of Technology:

Oulu Mining School:

- Mining Technology and Mineral Processing degree programme

Faculty of Information Technology and Electrical Engineering

- Department of Electrical Engineering
- Department of Communications Engineering
- Department of Computer Science and Engineering

Please consult the Faculty Study Guide to establish the language requirements for your own degree program.

Required proficiency level:

English must have been the A1 or A2 language at school or equivalent English skills should have been acquired otherwise.

ECTS Credits:

2 ECTS 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 (pedagogy): 1st year spring term
 Mathematical Sciences: 2nd year autumn term
 Physical Sciences: 1st year autumn term

Learning outcomes:

By the end of the course, you are expected to be able to

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

Contents:

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

Mode of delivery:

Contact teaching

Learning activities and teaching methods:

The scope of the course is 2 op (54 hours student workload).

Target group:

1st year students of Biology, Chemistry, Geology, Information Processing Science, Physics, and Mathematics (pedagogy); 2nd year students of Mathematics

Prerequisites and co-requisites:

-

Recommended optional programme components:

Students are also required to take 902004Y Scientific Communication, which is taken AFTER completion of this course.

Recommended or required reading:

Photocopies will be provided by the teacher and/or required texts will be accessible online or from the university library.

Assessment methods and criteria:

Student work is monitored by continuous assessment. You are required to participate regularly and actively in all contact teaching provided, and successfully complete all required coursework. There will be three monthly tests on material covered so far.

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

Grading:

Pass/Fail

Person responsible:

Karen Niskanen

Working life cooperation:

-

Other information:

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

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

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Leikkaavuudet:

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

Proficiency level:

B2/C1 on the 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 demonstrated your use of appropriate strategies and techniques for communicating effectively in English in an academic context.
2. to have demonstrated the ability to prepare and present scientific subjects to your classmates, using appropriate field-related vocabulary.

Contents:

Skills in listening, speaking, and presenting academic topics are practised in the classroom, where there is an emphasis on working in pairs and small groups. Homework tasks include online lecture listening and reading, preparation for classroom discussions and written work to support the classroom learning.

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.

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:

Karen Niskanen

Working life cooperation:

-

Other information:

-

780078Y: Orientation Course for New Students, 1 op

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Matti Niemelä

Opintokohteen kielet: Finnish

ECTS Credits:

1 credits/27 hours of work

Language of instruction:

Finnish

Timing:

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:

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.

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

Voimassaolo: 01.08.2014 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Opintokohteen kielet: Swedish

Leikkaavuudet:

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

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

901004Y Swedish 2.0 op

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

Voimassaolo: 01.08.2014 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Opintokohteen kielet: Swedish

Leikkaavuudet:

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

780079Y: Tutoring, 1 op

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: 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:** Field of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**Voidaan suorittaa useasti:** Kyllä

Ei opintojaksokuvauksia.

*be***780117P: General and Inorganic Chemistry A, 5 op****Voimassaolo:** 01.08.2015 -**Opiskelumuoto:** Basic Studies**Laji:** Course**Vastuuyksikkö:** Field of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

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

5 credits /134 hours of work

Language of instruction:

Finnish

Timing:

1st 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, chemical equilibrium, acids and bases, additional aspects of acid-base equilibria, solubility and complex-ion equilibria.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

32 hours of lectures and applications, 20 hours of exercises and 82 hours of self-study

Target group:

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

Prerequisites and co-requisites:

Upper secondary school chemistry

Recommended optional programme components:

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

Recommended or required reading:

Petrucci, R.H., Herring, F.G., Madura, J.D. ja Bissonnette, C.: General Chemistry: Principles and Modern Applications, 10. edition (also 7., 8. and 9. edition), Pearson Canada Inc., Toronto, 2011. Chapters 1 – 6, 15 – 18.

Assessment methods and criteria:

Two intermediate examinations or one final examination. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

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

Person responsible:

N.N.

Working life cooperation:

No

Other information:

No

780118P: General and Inorganic Chemistry B, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

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

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

Finnish

Timing:

1st autumn

Learning outcomes:

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

Contents:

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

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

36 hours of lectures and applications, 22 hours of exercises, 82 hours of self-study

Target group:

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

Prerequisites and co-requisites:

Upper secondary school chemistry

Recommended optional programme components:

-

Recommended or required reading:

Petrucci, R.H., Herring, F.G., Madura, J.D. ja Bissonnette, C.: General Chemistry: Principles and Modern Applications, 10. edition (also 7., 8. and 9. edition), Pearson Canada Inc., Toronto, 2011. Chapters 7 – 12.1, 12.5 – 12.7, 14, 19 – 20.

Assessment methods and criteria:

Two intermediate examinations or one final examination. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

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

Person responsible:

N.N.

Working life cooperation:

No

Other information:

No

780116P: Introduction to Organic Chemistry, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

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

ECTS Credits:

5 credits / 134 hours of work

Language of instruction:

Finnish. Book-examination in English as well.

Timing:

1st autumn and 1st spring

Learning outcomes:

After this course, the student can explain organic chemistry fundamentals, basic concepts and terminology, can use them for the 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.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

40 hours of lectures plus 10 hours of exercises, 80 hours of independent self-study

Target group:

Biochemistry, Chemistry, Biology, Process Engineering, Environmental Engineering and in the study entity of 25 credits, compulsory.

Physical Sciences, Geology, Geography, Mathematical Sciences, optional.

Prerequisites and co-requisites:

Upper secondary school chemistry

Recommended optional programme components:

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

Recommended or required reading:

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

Assessment methods and criteria:

Two intermediate examinations or one final examination.

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

Grading:

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

Person responsible:

Dr. Johanna Kärkkäinen

Working life cooperation:

No

Other information:

No

780119P: Introduction to Analytical Chemistry, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

780111P Introduction to Analytical Chemistry 4.0 op

780110P Analytical Chemistry I 5.5 op

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

Finnish

Timing:

2nd autumn

Learning outcomes:

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

Contents:

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

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

30 hours of lectures + 20 hours of exercises + 83 hours of self-study

Target group:

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

Prerequisites and co-requisites:

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

Recommended optional programme components:

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

Recommended or required reading:

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

Assessment methods and criteria:

Two intermediate examinations or one final examination. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

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

Person responsible:

Prof. Paavo Perämäki

Working life cooperation:

No

Other information:

No

780127P: Introductory Laboratory Works, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

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

ECTS Credits:

5 credits/134 hours of work

Language of instruction:

Finnish

Timing:

1st spring

Learning outcomes:

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

Contents:

Laboratory safety, basic laboratory equipment, basic chemistry techniques and determination methods as well as some of their theoretical background, keeping a laboratory notebook, writing reports.

Mode of delivery:

Supervised laboratory work, independently done preparatory problems.

Learning activities and teaching methods:

Safety in laboratory 2 hours, 65 hours of laboratory work + demonstrations + problems, 67 hours of self-study.

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

General and Inorganic Chemistry A (780117P, 5 cr) and Introduction to Organic Chemistry (780116P, 5 cr). Student is allowed to participate to the course simultaneously when participating the prerequisites. Attendance at the lecture of Safety in laboratory is compulsory.

Recommended optional programme components:

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

Recommended or required reading:

Instruction Book (in Finnish): Kemian perustyöt 780127P

Assessment methods and criteria:

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

Grading:

The course utilizes verbal grading scale pass/fail.

Person responsible:

Ph.D. Teija Kangas

Working life cooperation:

No

Other information:

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

A325202: Chemistry, Intermediate Studies, 63 - 105 op

Opiskelumuoto: Intermediate Studies

Laji: Study module

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

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781301A: Inorganic Chemistry I, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

780353A Inorganic Chemistry I 6.0 op

780356A Inorganic Chemistry 9.0 op

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

Finnish

Timing:

2nd spring

Learning outcomes:

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

Contents:

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

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

38 hours of lectures, 4 hours of exercises, self-study 92 hours

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

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

Recommended optional programme components:

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

Recommended or required reading:

Weller, M., Overton, T., Rourke, J., and Armstrong, F.: Inorganic Chemistry, 6th ed., Oxford University Press, Oxford 2014. Chapters 1-4, 6, 8.

Assessment methods and criteria:

The assessment of the course is based on the final examination. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

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

Person responsible:

Doc. Raija Oilunkaniemi

Working life cooperation:

No

Other information:

No

781302A: Inorganic Chemistry II, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Raija Oilunkaniemi

Opintokohteen kielet: Finnish

Leikkaavuudet:

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

ECTS Credits:

5 credits / 134 hours of work

Language of instruction:

Finnish/English on demand

Timing:

2nd spring

Learning outcomes:

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

Contents:

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

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

32 hours of lecture, 4 hours of exercises, self-study 98 hours

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

Inorganic Chemistry I (781301A) lectures

Recommended optional programme components:

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

Recommended or required reading:

Weller, M., Overton, T., Rourke, J., and Armstrong, F.: Inorganic Chemistry, 6th ed., Oxford University Press, Oxford 2014. Chapters 5, 7, 8, 19-27.

Assessment methods and criteria:

The assessment of the course is based on the final examination.

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

Grading:

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

Person responsible:

Raija Oilunkaniemi

Working life cooperation:

No

Other information:

No

780354A: Laboratory Course I in Inorganic Chemistry, 5 op**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Field of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**ECTS Credits:**

5 credits/ 134 hours of work

Language of instruction:

Finnish

Timing:

2nd spring

Learning outcomes:

At the end of the course, the students should have acquired an understanding of basic qualitative inorganic chemistry, classical quantitative inorganic chemistry 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, 45 hours of work reports + final examination, 9 hours of self-study.

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

General and Inorganic Chemistry a and b (780117P and 780118P), Introduction to Organic Chemistry (780103P or 780112P or 780116P). Introductory Laboratory Course in Chemistry (780122P or 780123P)

Recommended optional programme components:

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

Recommended or required reading:

Material handed out in the laboratory

Assessment methods and criteria:

Works, reports and the final exam passed. The works must be done within the next two years. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail. 75 % laboratory work and 25 % final examination.

Person responsible:

PhD Matti Niemelä

Working life cooperation:

No

Other information:

Reports must be returned to the teaching assistants by the given deadline. Otherwise you have to do the work again.

781303A: Physical Chemistry I, 5 op**Voimassaolo:** 01.08.2015 -**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Field of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

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

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

Finnish

Timing:

1st spring

Learning outcomes:

Upon completion the student should be able to display an understanding of the main topics of chemical thermodynamics and kinetics. During the course such concepts are introduced that are needed for the discussion of equilibria in chemistry. Much emphasis is in enthalpy, entropy and Gibbs energy. A unified view of equilibrium and the directions of spontaneous change are obtained in terms of chemical potentials of substances.

Contents:

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

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

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

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

General and Inorganic Chemistry A (780117P) and General and Inorganic Chemistry B (780118P) or General and Inorganic Chemistry I (780114P) and General and Inorganic Chemistry II (780115P) or Introduction to Chemistry (780113P) or Introduction to Physical Chemistry (780101P) and Introduction to Inorganic Chemistry (780102P); or Basic Principles in Chemistry(780109P).

Recommended optional programme components:

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

Recommended or required reading:

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

Assessment methods and criteria:

Two intermediate examinations or one final examination Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

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

Person responsible:

Prof. Jouni Pursiainen

Working life cooperation:

No

Other information:

No

781304A: Physical Chemistry II, 5 op**Voimassaolo:** 01.08.2015 -**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Field of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

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

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

Finnish

Timing:2nd autumn, lectured annually**Learning outcomes:**

After completing this course, the student has a good knowledge about the basics of quantum mechanics, especially in atoms and small molecules, and can apply it in simple problems. In addition, the student will learn the basics of statistical mechanics and molecular motion and how they can be used to connect the microscopic atomistic phenomena to the macroscopic thermodynamic quantities, such as pressure and heat capacity etc. Student will also learn the basics of molecular motions in gases and liquids as well as kinetics and mechanisms of chemical reactions.

Contents:

Basics of quantum mechanics, electronic structure of atoms and simple molecules, statistical mechanics and its connection to thermodynamics and molecular motion, molecular motions in gases and liquids, and chemical kinetics and reaction mechanisms.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

44 hours of lectures + 12 hours of exercises, self-study 78 hours

Target group:

Chemistry, chemistry teachers, compulsory

Prerequisites and co-requisites:

Physical Chemistry I (780347A or 781303A), Mathematics for physics (763101P) or the corresponding knowledge

Recommended optional programme components:

The course is 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, 10th ed., 2014, Oxford University Press, Chapters 7-10, 12-14. Similar chapters in 8th and 9th editions also suffice.

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:

Professor Risto Laitinen

Working life cooperation:

No

Other information:

No

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

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Anne Heponiemi

Opintokohteen kielet: Finnish

ECTS Credits:

5 credits/134 hours of work

Language of instruction:

Finnish

Timing:

2nd autumn

Learning outcomes:

Upon completion of the course, the student should have acquired knowledge and understanding of basic experimental methods of physical chemistry which are learned in theory in the course Physical Chemistry I.

Contents:

Calorimetric studies, distribution law, vapour pressure of solvent, partial mole volume, distillation of a mixture of liquids, crystallization of a liquid mixture, potentiometric acid-base titration, absorption, electromotive force.

Mode of delivery:

Face-to-face teaching. The course contains guided laboratory works which include independently written laboratory reports from the works.

Learning activities and teaching methods:

2 hours of lectures of safety at work (obligatory), 68 hours of laboratory experiments. Additionally, written laboratory reports, one per laboratory work, 64 hours

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

Courses General and Inorganic Chemistry A (780117P) and General and Inorganic Chemistry B (780118P) OR Courses General and Inorganic Chemistry I (780114P) and General and Inorganic Chemistry II (780115P), or Introduction to Chemistry (780113P), and Introductory Laboratory Works in Chemistry (780122P or 780123P) 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:

Practical work handout; Atkins, P. W.: Physical Chemistry, 8th ed., Oxford University Press, 2006, partly. Or a newer edition.

Assessment methods and criteria:

Preliminary plan of laboratory work, 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. Anne Heponiemi

Working life cooperation:

No

Other information:

Reports must be returned to the teachers by the given deadline. Otherwise the work have to be done again.

781305A: Organic Chemistry I, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

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

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

Finnish

Timing:

2nd autumn

Learning outcomes:

After passing the course the student can explain the basics in molecular orbitals in simple organic compounds such as ethane, details in nucleophilic substitution, conformation and the basics in stereochemistry of organic compounds.

Contents:

Including molecular orbitals in organic compounds, conformation theory, nucleophilic substitution and basics of stereochemistry.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

40 hours of lectures, 94 hours self study

Target group:

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

Prerequisites and co-requisites:

Introduction to Organic Chemistry (780103P or 780116P) and the courses General and Inorganic Chemistry A (780117P) and General and Inorganic Chemistry B (780118P); or the courses General and Inorganic Chemistry I (780114P) and General and Inorganic Chemistry II (780115P); OR Introduction to Chemistry (780113P) or Introduction to Physical Chemistry (780101P).

Recommended optional programme components:

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

Recommended or required reading:

Clayden, J., Greeves, N., Warren, S., Wothers, P.: Organic Chemistry, Oxford University Press, 2001 and Clayden, J., Greeves, N., Warren, S.: Organic Chemistry, Oxford University Press, 2nd Edition, 2012.

Assessment methods and criteria:

Two intermediate examinations or one final examination Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

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

Person responsible:

N.N.

Working life cooperation:

No

Other information:

No

781306A: Organic Chemistry II, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

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

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

Finnish/English on demand

Timing:

2nd spring

Learning outcomes:

After this course, the student can profoundly explain and analyze mechanisms of various organic chemistry reactions and predict reaction outcome.

Contents:

Eliminations, addition to alkenes, Diels-Alder reactions, chemistry of aromatic heterocycles, formation of enols and enolates and their reactions.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

38 hours of lectures, 96 hours of self study

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

Organic Chemistry I (781305A)

Recommended optional programme components:

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

Recommended or required reading:

Lecture material and Clayden, J., Greeves, N., Warren, S., Wothers, P.: Organic Chemistry, Oxford University Press, 2001 and Clayden, J., Greeves, N., Warren, S.: Organic Chemistry, 2nd edition, Oxford University Press, 2012.

Assessment methods and criteria:

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

Grading:

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

Person responsible:

PhD Juha Heiskanen

Working life cooperation:

No

Other information:

No

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

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

780329A Laboratory Course I in Organic Chemistry 4.0 op

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

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

Timing:

2nd autumn

Learning outcomes:

Upon completion of the five different syntheses of the course, the student is familiar with safety issues, glassware and equipment, use of laboratory notebook and reporting of laboratory experiments. He/she should be able to work by using basic techniques of organic chemistry such as distillation, extraction, crystallization, TLC.

Contents:

Five different organic syntheses.

Mode of delivery:

Face-to-face teaching in the laboratory

Learning activities and teaching methods:

4 h lectures (obligatory for all), 52h laboratory of supervised, independent laboratory work and 78 h self-study and reporting.

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

General and Inorganic Chemistry A and General and Inorganic Chemistry B (780117P and 780118P), Introduction to Organic Chemistry (780116P), and Introductory Laboratory Course (780123P/780127P) passed.

Or General and Inorganic Chemistry I and General and Inorganic Chemistry II (780114P and 780115P), or Introduction to Chemistry (780113P) or Introduction to Physical Chemistry (780101P) and Introduction to Inorganic Chemistry (780102P) or Basic Principles in Chemistry (780109P), Introduction to Organic Chemistry (780103P), and Introductory Laboratory Course (780122P or 780123P) passed.

Recommended optional programme components:

Participation in the course 781305A Organic Chemistry I.

Recommended or required reading:

Laboratory Course Manual. Clayden, J., Greeves, N., Warren, S., and Wothers, P.: Organic Chemistry, Oxford University Press, 2001 or Clayden, J., Greeves, N., Warren, S.: Organic Chemistry, Oxford University Press, 2nd edition, 2012.

Assessment methods and criteria:

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.

Person responsible:

PhD 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.

781308A: Instrumental Analysis, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

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

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

Finnish

Timing:

3rd autumn

Learning outcomes:

After completing this course, the student should be able to understand the principles of most common instrumental methods of analysis that are used, for example, in industry and research.

Contents:

Atomic and molecular spectroscopy, X-ray fluorescence spectrometry, Electroanalytical methods, Thermal analysis, Mass spectrometry, Chromatography.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

40 hours of lectures + 6 hours of exercises + 88 hours of self-study

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

Introduction to Analytical Chemistry (780111P or 780119P)

Recommended optional programme components:

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

Recommended or required reading:

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

Assessment methods and criteria:

Two intermediate examinations or one final examination. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

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

Person responsible:

Prof. Paavo Perämäki

Working life cooperation:

No

Other information:

No

780301A: Research Training, 9 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: 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: Conductivity of an electrolytic solution, adsorption of solution, rate of chemical reaction, and practical modelling work and report done in the NMR research group of Physics.

in Organic Chemistry: Three different syntheses and qualitative analysis of a mixture of three unknown compounds. Written laboratory report from each practical. Written laboratory report from each practical. Additionally, written laboratory reports, one per practical.

Mode of delivery:

Supervised laboratory works

Learning activities and teaching methods:

240 hours of laboratory works and reports (80 h/laboratory). See more detailed information from description each of module 780301A-01, 780301A-02 , and 780301A-03.

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

The compulsory courses of chemistry in the first and second year.

Recommended optional programme components:

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

Recommended or required reading:

In Inorganic Chemistry: Material handed out in the laboratory, in Physical Chemistry: Practical work handout. Atkins, P.W. Physical Chemistry, 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.

781320A: Bachelor's Thesis, 9 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

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

ECTS Credits:

9 credits /240 hours of work

Language of instruction:

Finnish, English on demand

Timing:

3rd autumn and 3rd spring

Learning outcomes:

After this course, the student can search scientific information from the chemistry literature using computer-assisted search methods. He/she can estimate, structure and apply the information while writing a scientific report as well as preparing a poster and oral presentation. The student can adapt the principles of the oral presentation for a talk and apply ethical principles for research and reporting. The student can work in a group, present a poster or give a scientific talk for an audience.

Contents:

Chemistry literature, guidelines for good scientific practice and scientific writing. Use of SciFinder search program in the information retrieval. Preparation and presentation of a poster and seminar talk from the subject, which is related to the Bachelor's thesis. The structure, content and preparation of the Bachelor's thesis.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

10 h of the lectures, 6 h of the demonstrations of the search program and exercises, a poster seminar (3 h), 6 h of the group meetings due to the preparation of candidate's thesis and a course Information Search (8 h). The attendance in the seminar talks of the fellow students and the student's own scientific presentation on a scientific subject related to the B.Sc. thesis (20 min.) during a spring term.

Target group:

Chemistry, Chemistry subject teacher, compulsory

Prerequisites and co-requisites:

The first and second year courses in Chemistry.

Recommended optional programme components:

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

Recommended or required reading:

Lecture handout

Assessment methods and criteria:

The preparation and introduction of a poster. The thesis of ca. 20-40 pages including ca. 30 references. The student gives a scientific presentation (20 min). The compulsory attendance at the lectures, demonstrations, group meetings and seminars. The analysis of the student's own and fellow students' seminar talks. In addition, the student takes a maturity examination on the subject of the B.Sc. thesis. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

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

Person responsible:

Lecturer Johanna Kärkkäinen, Lecturer Minna Tiainen and Science and Technology Library Tellus. The Bachelor's thesis is supervised by Professors, Docents, University Lectures or Post-doctoral Researchers.

Working life cooperation:

No

Other information:

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

780381A: Maturity test, 0 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

0 credits/2 hours of work

Language of instruction:

Finnish (Swedish or English)

Timing:

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

802161P: Introduction to Real Functions, 5 op

Voimassaolo: 01.06.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

802154P Elementary functions 3.0 op

800147P Basic Methods in Mathematics I / appl. 8.0 op

ECTS Credits:

5 ECTS credits

Language of instruction:

Finnish

Timing:

1st year, 1st period

Learning outcomes:

After completing the course the student is able to

- operate with elementary functions
- calculate derivatives and apply them
- use different integration techniques
- apply calculus in problem solving

Contents:

The course concerns real-valued functions of one variable and their calculus. In addition to calculation techniques, effort is made to understand the underlying concepts so that they can be applied in problem solving. The aim of the course is to develop calculation routine as well as deductive skills.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

28h lectures, 14h exercises, 91h study a part of which may be guided

Target group:

Mathematics major and minor students

Prerequisites and co-requisites:

No

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Final exam

Grading:

1-5, fail

Person responsible:

Pekka Salmi

Working life cooperation:

No

Other information:

-

477011P: Introduction to Process and Environmental Engineering I, 5 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Process and Environmental Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Aki Sorsa

Opintokohteen kielet: Finnish

Leikkaavuudet:

470219A Introduction to Process Engineering 3.5 op

ECTS Credits:

5 ECTS /133 hours of work

Language of instruction:

Finnish

Timing:

Implementation during periods 1-2 on the autumn term

Learning outcomes:

The objective of this course is to give insight to the whole perspective of process and environmental engineering and to familiarise the students with the terminology involved. In addition, the objective is also to outline the connections between process and environmental engineering and other fields closely related to them.

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 is divided into the next 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:

Group work and contact lectures supporting those

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 study fields 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 also expected that the students seek material for completing the assignments independently.

Assessment methods and criteria:

The assignments (altogether 8) 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:

Dr Aki Sorsa

Working life cooperation:

No

Other information:

The assessment method utilized requires the active attendance to the group work and contact lectures from the beginning of the course

488010P: Introduction to Process and Environmental Engineering II, 5 op

Voimassaolo: 01.08.2013 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Process and Environmental Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Fabritius, Timo Matti Juhani, Jukka Käräjäoja

Opintokohteen kielet: Finnish

Leikkaavuudet:

488011P Introduction to Environmental Engineering 5.0 op

477012P Introduction to Automation Engineering 5.0 op

ECTS Credits:

5 cr / 135 hours of work

Language of instruction:

Available only in Finnish

Timing:

The course is given in the spring semester, during periods III and IV. It is recommended to complete the course at the 1st spring semester.

Learning outcomes:

Students can examine industrial processes using the methods and perspectives of process and environmental engineering (e.g. material management, phenomenon-based considerations and automation) and they recognize the

role of different areas of the process and environmental engineering, when these areas are considered in the forthcoming courses.

Contents:

1. Materials in industrial processes. 2. Water resources and land use. 3. Rehabilitation methods. 4. Chemical reactions and reactors. 5. Bioprocess engineering. 6. PI diagrams. 7. Control and operation of processes.

Mode of delivery:

Classroom education

Learning activities and teaching methods:

Group exercises and contact-education (14 h) that supports these exercises. Available only in Finnish.

Target group:

Students of process and environmental engineering

Prerequisites and co-requisites:

None

Recommended optional programme components:

This course is an introduction to the other courses of process and environmental engineering

Recommended or required reading:

Material will be distributed during lectures and via course www-site

Assessment methods and criteria:

Group exercises. Please note that the course is not available in English, but only in Finnish.

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:

Professor Timo Fabritius

Working life cooperation:

No

Other information:

It is highly recommended that the students are present already in the first lecture, since it is not possible to come along after the course has already begun.

750121P: Cell biology, 5 op

Voimassaolo: - 31.07.2020

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Biology

Arvostelu: 1 - 5, pass, fail

Opettajat: Kuittinen, Helmi Helena, Häggman, Hely Margaretha, Henrika Honkanen, Jaana Jurvansuu

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

Finnish.

Timing:

B.Sc. 1st autumn.

Learning outcomes:

The student is familiar with cellular structure and functioning in plant and animal cells, understands the social structures in multicellular species and knows why and how the genetic organizations (in nucleus, chloroplast and mitochondria) are co-operating, maintaining and regulating the cellular metabolism. Student understands the common origin and evolution of life on planet Earth, and understands the material basis and mechanisms of this continuity.

Contents:

During the recent years especially the development of molecular and microscopic and imaging techniques has increased our knowledge on cells and their social interactions. The structural and functional characteristics of plant and animal cells will be covered as well as the genetic organization maintaining and regulating the system.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

50 h lectures, three exams (zoology, plant biology, genetics). Home essays and internet material.

Target group:

Compulsory to the biology and biochemistry students.

Prerequisites and co-requisites:

Good basics in biology from elementary school.

Recommended optional programme components:

Cell biology is prerequisite for the following courses: Developmental biology-histology (755320A), Animal physiology (755323A), Plant biology lectures (756346A), Concepts of genetics (757109P). Course also gives readiness for studies in molecular biology and biochemistry.

Recommended or required reading:

Suitable parts of Campbell et al. 2014: Biology: a global approach (10e), Pearson, 1350 s. 978-1-292-00865-3, Alberts, B. et al. 2014: Molecular Biology of the Cell (6e), Garland Science Publishing, London, 1464 s. ISBN: 9780815345244 (or Lodish et al. 2012: Molecular Cell Biology (7e). Freeman, 973 s. ISBN-10: 1-4292-3413-X), Heino J. & Vuento M. 2014: Biokemian ja solubiologian perusteet (3. painos) WSOY Pro Oy, Helsinki, Jones R. et al. 2013: The molecular life of plants. Wiley-Blackwell, 742 s. ISBN : 978-0-470-87012-9.

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

[\[HK1\]](#)linkkiä en osannut uudistaa

Assessment methods and criteria:

Three exams.

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

Grading:

1-5 / Fail. Final grade is average value of the three exams.

Person responsible:

Dr. Jaana Jurvansuu, Dr. Helmi Kuittinen and Prof. Hely Häggman.

Working life cooperation:

No.

Other information:

-

766101P: Mathematics for physics, 5 op

Voimassaolo: 01.01.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay766101P Mathematics for physics (OPEN UNI) 5.0 op

763101P Vector and tensor analysis 6.0 op

ECTS Credits:

5 credits

Language of instruction:

Finnish

Timing:

First autumn

Learning outcomes:

The course quickly provides the student the basic mathematical knowledge and skills required in physical sciences. The objective is to learn the basics of differential and integral calculus, methods for solving the most typical first and second order differential equations and the basics of vector differential calculus. After the course the student understands the basic mathematical methods needed in physics and is able to apply them to problems arising in the different physics courses. Another objective is also to understand the geometrical meaning of different mathematical concepts and their connection to physical phenomena.

Contents:

Integral and differential calculus, complex variables and functions, introduction to differential equation

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 28 h, exercises 22 h, self-study 83 h

Target group:

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

Prerequisites and co-requisites:

No specific prerequisites

Recommended optional programme components:

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

Recommended or required reading:

Lecture notes.

Assessment methods and criteria:

Four written intermediate examinations or final examination

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

Grading:

Numerical grading scale 0 – 5, where 0 = fail

Person responsible:

Seppo Alanko

Working life cooperation:

No work placement period

Other information:

<https://noppa oulu fi/noppa/kurssi/766101P/etusivu>

771102P: Basic course in mineralogy, 6 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opettajat: Pekka Tuisku

Opintokohteen kielet: Finnish

ECTS Credits:

6 credits

Language of instruction:

Finnish

Timing:

1st year autumn

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:

Pekka Tuisku, Jukka Pekka Ranta

Working life cooperation:

No

Other information:

771113P: Introduction to Geology I, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay771113P Introduction to Geology I (OPEN UNI) 5.0 op

ECTS Credits:

5 credits

Language of instruction:

Finnish

Timing:

1st year autumn

Learning outcomes:

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

Contents:

Evolution of the Earth as part of the solar system, structure and composition of the Earth. Classification of igneous rocks, magmatism, origin and crystallisation of magmas, volcanism, metamorphism and formation of metamorphic rocks, plate tectonics and deformation structures.

Mode of delivery:

Face to face

Learning activities and teaching methods:

36 h lectures, 6 h exercises

Target group:

1st year geoscience students. The course is a good minor subject course for others.

Prerequisites and co-requisites:

Basic course in mineralogy (771102P) is parallel to this course.

Recommended optional programme components:

This course is intended as an introduction to the scope and methods of igneous and metamorphic petrology.

Recommended or required reading:

Martti Lehtinen, Pekka Nurminen and Tapani Rämö (1998) Suomen kallioperä – 3000 vuosimiljoonaa. Suomen Geologinen Seura, Gummerus Jyväskylä, ISBN 952-90-9260-1, Chapters 2-3. John Grotzinger & Thomas H. Jordan (2010 or 2014) Understanding Earth, 6th or 7th edition, Chapters 1-4, 6-7, 9-10, 12.

Assessment methods and criteria:

Written examination and identification test of rock types.

Grading:

5-1/fail

Person responsible:

Eero Hanski

Working life cooperation:

No

771114P: Introduction to Geology II, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opettajat: Eero Hanski

Opintokohteen kielet: Finnish

ECTS Credits:

5 credits

Language of instruction:

Finnish

Timing:

1st year autumn

Learning outcomes:

Upon completion of the course, students should have acquired basic knowledge on the concepts and processes of surficial geology. Students should also be able to identify basic sediment types and soils.

Contents:

Basic concepts of surficial physical geology, weathering, erosion, sedimentation, and sediment types, soils and geological processes forming sedimentary deposits.

Mode of delivery:

Face to face

Learning activities and teaching methods:

16 h lectures, 8 h exercises

Target group:

1st year Geoscience students. The course is a good minor subject course for others.

Prerequisites and co-requisites:

-

Recommended optional programme components:

-

Recommended or required reading:

Handouts and John Grotzinger & Thomas H. Jordan (2010 or 2014) Understanding Earth, 6th or 7th edition, Chapters 5, 8, 15-21.

Assessment methods and criteria:

Obligatory exercises and written examination.

Grading:

5-1/fail

Person responsible:

Juha Pekka Lunkka and Tiina Eskola

Working life cooperation:

No

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

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

5 credits

Language of instruction:

Finnish

Timing:

1st year spring

Learning outcomes:

Students can describe the main features and raw material resources of the Finnish Quaternary deposits.

Contents:

Main features and raw material resources of the Finnish Quaternary deposits and their origin.

Mode of delivery:

Face to face

Learning activities and teaching methods:

22 h lectures. In addition, a one-day field trip is organized in May for major subject students.

Target group:

1st year geoscience students.

Prerequisites and co-requisites:

Introduction to Geology II (771114P) or equivalent knowledge.

Recommended or required reading:

Veli-Pekka Salonen, Matti Eronen, Matti Saarnisto (2002) Käytännön maaperägeologia, 236 p.

Assessment methods and criteria:

Written examination.

Grading:

5-1/fail

Person responsible:

Juha Pekka Lunkka

Working life cooperation:

No

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

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

5 credits

Language of instruction:

Finnish

Timing:

1st year spring

Learning outcomes:

Students can describe and recognise the main geological units of the Finnish bedrock and name them based on their stratigraphic position and age relations. They can connect the major geological units to the main stages of the plate tectonic evolution. Students are familiar with most common ore types and industrial minerals occurring in the bedrock and the principal processes leading to their formation and how they are explored.

Contents:

Lithostratigraphical units, the Archaean and Palaeoproterozoic bedrock of Finland and younger rock formations. Mineral resources, their classification and origin, exploration methods.

Mode of delivery:

Face to face

Learning activities and teaching methods:

24 h lectures. In addition, a one-day field trip is organized in May for major subject students.

Target group:

Major and minor subject students starting studies in geology.

Prerequisites and co-requisites:

Basic course in mineralogy (771102P), Introduction to Geology I (771113P), Introduction to Geology II (771114P) or equivalent knowledge.

Recommended or required reading:

Material given during the lectures and Lehtinen, M., Nurmi, P., Rämö, T. (1998) Suomen kallioperä – 3000 vuosimiljoonaa. Suomen Geologinen Seura, Gummerus Jyväskylä, ISBN 952-90-9260-1, p. 94-324 (available on webpages of Suomen Geologinen Seura). Parts of Craig, J.R., Vaughan, D.J. & Skinner, B.J. (1996) Resources of the Earth - Origin, Use, and Environmental Impact. Prentice Hall, 472 p.

Assessment methods and criteria:

Written examination.

Grading:

5-1/fail

Person responsible:

Eero Hanski

Working life cooperation:

No

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.

781650S: Atomic Spectrometric Techniques, 5 op**Voimassaolo:** 01.08.2015 -**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Field of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**ECTS Credits:**

5 credits /134 hours of work

Language of instruction:

Finnish. English on demand.

Timing:

4th or 5th spring. The course is lectured every other year, next time during the spring 2017.

Learning outcomes:

Upon completion of the course, student should have acquired knowledge and understanding of AAS (especially ETAAS) and plasma based techniques (ICP-OES, ICP-MS), their theoretical background and modern instrumentation. Student is also able to describe the advantages and "weak points" of the techniques in the point of view of elements and samples to be analyzed. In addition, knowledge is acquired on the optimization of measurement procedures and interference effects and their elimination.

Contents:

Origin of atomic absorption, atomic emission and atomic mass spectra. Instrument components and their properties, optimization of the determination procedures (incl. interference effects and their correction), and instrument diagnostics. Special sample introduction techniques and hyphenated techniques.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

30 hours of lectures and seminars + 103 hours of self-study incl. practical project work

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Instrumental Analysis (780328A or 781308A)

Recommended optional programme components:

Previous 781637S Atomispektrometric Methods 4 credits and 781638S ICP-MS Workshop 3 credits

Recommended or required reading:

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

Assessment methods and criteria:

Final examination or home assignment. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

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

Person responsible:

Prof. Paavo Perämäki

Working life cooperation:

No

Other information:

No

781321A: Bachelor's Thesis, 8 op

Voimassaolo: 01.01.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

780109P: Basic Principles in Chemistry, 4 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field 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	5.0 op
780117P	General and Inorganic Chemistry A	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	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

Learning outcomes:

Learning activities and teaching methods:

The course is not lectured any more. There are final examinations of the course during the academic years 2015-2016 and 2016-2017.

Person responsible:

Lecturer Minna Tiainen

780120P: Basic Principles in Chemistry, 5 op

Voimassaolo: 01.08.2016 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

780117P General and Inorganic Chemistry A 5.0 op

780109P Basic Principles in Chemistry 4.0 op

ECTS Credits:

5 credits/134 hours of work

Language of instruction:

Finnish

Timing:

1st autumn

Learning outcomes:

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, thermodynamics.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

40 hours of lectures and 94 hours of self-study

Target group:

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

Prerequisites and co-requisites:

The compulsory course in upper secondary school chemistry (1st course)

Recommended optional programme components:

The course is not included in the 25 ECTS credits entity of chemistry!

Recommended or required reading:

Tro, N.J., Principles of Chemistry. A Molecular Approach, Pearson, 3. edition, 2016

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

780372A: Basic Principles of Green Chemistry, 4 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: 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

Learning activities and teaching methods:

The course is not lectured any more.

782641S: Catalysis, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

Finnish/English on demand

Timing:

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

Learning outcomes:

Upon successful completion students should have a basic understanding of the theory of catalysis. Thermodynamic and kinetic background will be studied, including mechanisms of the most important catalytic reactions. Applications, preparation, characterisation and structure of homogenous, heterogeneous and enzymatic catalysts will be discussed.

Contents:

Principles of catalysis, homogeneous catalysis in solutions, polymer catalysis, zeolites, heterogeneous catalysis on surfaces.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

40 hours of lectures, 94 hours of self-study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Physical Chemistry I (780347A)

Recommended optional programme components:

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

Recommended or required reading:

Examination is based on the lectures.

Assessment methods and criteria:

Final examination

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

Grading:

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

Person responsible:

Prof. Jouni Pursiainen

Working life cooperation:

No

Other information:

No

780681S: Chemical Legislation in Finland, 1 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field 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

Timing:

4th spring

Learning activities and teaching methods:

The course is lectured no more.

780321A: Chemical Legislation in Finland, 1 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field 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

780395A: Chemistry for Teachers, 4 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

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:

PhD Teija Kangas

Working life cooperation:

No

Other information:

No

782638S: Chemistry in Industrial Applications, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

782338A Chemistry in Industrial Applications 5.0 op

ay782638S Chemistry in Industrial Applications (OPEN UNI) 5.0 op

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th or 5th spring. The course is lectured every other year, next time during the spring 2016.

Learning outcomes:

Upon completion of the course, the student will be able to explain several chemical applications in process and environmental technology. In particular, the student knows the novel applications in which chemistry is used.

Contents:

Catalytic applications in water purification, catalytic oxidation, preparation of biofuels from biomass, biomass gasification and the utilisation of biogas, chemistry and chemical reactions in mining processes etc. (visiting lecturers from the companies)

Mode of delivery:

Face-to-face teaching and seminars

Learning activities and teaching methods:

40 hours of lectures, 10 hours of seminars, 84 hours of self-study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Physical Chemistry I and Physical Chemistry II

Recommended optional programme components:

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

Recommended or required reading:

Material given by the lecturer, scientific review papers

Assessment methods and criteria:

Final 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

782640S: Chemistry of Hydrometallurgical Processes, 5 op**Voimassaolo:** 01.08.2015 -**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Field of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**ECTS Credits:**

5 credits /134 hours of work

Language of instruction:

Finnish, English on demand

Timing:

4th or 5th spring. The course is lectured every other year, next time during the spring 2017.

Learning outcomes:

Upon completion of the course, the student will be able to explain chemical principles of hydrometallurgical processes and phenomena. The student knows the most important chemical reactions and variables affecting hydrometallurgical processes. Process chemistry is significant in several industrial applications, and those applications are considered during the course.

Contents:

Introduction to hydrometallurgical processes, pre-treatment of concentrates (oxidation, heat treatment), principles of dissolution (including leaching and bioleaching) and purification, chemical precipitation and other metals recovery processes (extraction, ion-exchange), electrical processes and process chemistry (electrolysis, corrosion).

Mode of delivery:

Face-to-face teaching and seminars

Learning activities and teaching methods:

40 hours of lectures, 10 hours of seminars, 84 hours of self study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Physical Chemistry I and Physical Chemistry II

Recommended optional programme components:

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

Recommended or required reading:

Lecture notes (in English).

Assessment methods and criteria:

Final examination

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

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

Person responsible:

Prof. Ulla Lassi

Working life cooperation:

No

Other information:

No

782639S: Electrochemistry, 5 op**Voimassaolo:** 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th or 5th autumn. The course is lectured every other year, next time during the autumn 2018.

Learning outcomes:

Upon completion of the course, the student will be able to explain the essential phenomena of electrochemistry, such as electrochemical reactions, electrolytes and related thermodynamics. The student knows the principle of electrochemical cells (batteries and fuel cells) and kinetics of electrochemical reactions. These phenomena are significant in chemical and metal industry, such as in metal recovery by electrolysis.

Contents:

Introduction to electrochemistry, electrochemical reactions and reaction kinetics, electrolytes and thermodynamics of electrolytic solutions, electrochemical cells (batteries and fuel cells), measurement methods of electrochemical properties, applications of electrochemistry.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

50 hours of lectures, 84 hours of self study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Physical Chemistry I and Physical Chemistry II

Recommended optional programme components:

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

Recommended or required reading:

Murtomäki, L., Kallio, T., Lahtinen, R. & Kontturi, K.: Sähkökemia, 2. painos, 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:

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

781309A: Environmental Chemistry, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay781309A Environmental Chemistry for Chemistry Teachers 5.0 op

780373A Environmental Chemistry 3.0 op

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

ECTS Credits:

5 credits /134 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. The student should have understanding of twelve principles of green chemistry. After the course the student is acquainted with the limitations of the use of dangerous chemicals and is able to find updated information of them.

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. Environmental friendly chemistry. The principles of green chemistry with examples of real life.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

50 hours of lectures, essay 20 hours, self-study 64 hours

Target group:

Chemistry, optional

Prerequisites and co-requisites:

General and Inorganic Chemistry I and II ((780114P ja 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:

van Loon, G.W. & Duffy, S.J.: Environmental Chemistry, A Global Perspective, Oxford, 2000; Lancaster M.: Green Chemistry: An introductory text, RSC, 2002.

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

781657S: Experimental Design, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

Finnish. English on demand.

Timing:

4th or 5th spring. The course is lectured every other year, next time during the spring 2016.

Learning outcomes:

After this course student becomes aware of importance experimental design and is able to apply most common experimental designs in the field of chemistry.

Contents:

Factorial designs, mixture designs, D-optimal designs, response surface methodology. Computer programmes are applied during the course in the design and analysis of experiments.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

30 hours of lectures and exercises + 103 hours of self-study incl. computer aided analysis of experimental data

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Metrological Fundamentals of Analytical Chemistry (781651S)

Recommended optional programme components:

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

Recommended or required reading:

Massart, D.L., Vandeginste, B.G.M., Buydens, L.M.C., De Jong, S., Lewi, P.J. and Smeyers-Verbeke, J.: Handbook of Chemometrics and Qualimetrics: Part A, Elsevier, 1997, partly.

Assessment methods and criteria:

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

Grading:

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

Person responsible:

Prof. Paavo Perämäki

Working life cooperation:

No

Other information:

No

781600S: Final Examination in Inorganic Chemistry, 7 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

7 credits/187 hours of work

Language of instruction:

Finnish, 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:

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

780683S-01: Final Examination in Inorganic Chemistry (Teacher), 0 op

Voimassaolo: 01.01.2015 -

Opiskelumuoto: Advanced Studies

Laji: Partial credit

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

7 credits/ 187 hours of work

Language of instruction:

Finnish

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:

Teachers

Prerequisites and co-requisites:

No

Recommended optional programme components:

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

Recommended or required reading:

The students of teacher training line take final examinations in two majors (3,5 cr each). The textbooks are:
Inorganic Chemistry. Cotton, F. A., Wilkinson, G. ja Gaus, P. L.: Basic Inorganic Chemistry, 3. painos, Wiley & Sons, 1995.

Physical Chemistry. Atkins P. and De Paula, J., Atkins' Physical Chemistry, Oxford University Press, Oxford, 9. painos (2009) tai uudempi.

Organic Chemistry. Clayden, J., Greeves, N., Warren, S. ja Wothers, P.: Organic Chemistry, Oxford University Press, 2. painos, 2012., (valituin osin).

Structural Chemistry. By separate agreement.

Assessment methods and criteria:

1 final examination/major

Grading:

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

Person responsible:

Professors

Working life cooperation:

No

Other information:

No

783600S: Final Examination in Organic Chemistry, 7 op**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Field of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**ECTS Credits:**

7 credits/187 hours of work

Language of instruction:

Finnish, 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:

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

780683S-03: Final Examination in Organic Chemistry (Teacher), 0 op**Voimassaolo:** 01.01.2015 -**Opiskelumuoto:** Advanced Studies**Laji:** Partial credit**Vastuuyksikkö:** Field of Chemistry**Arvostelu:** 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

7 credits/187 hours of work

Language of instruction:

Finnish

Timing:

5th 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:

Teachers

Prerequisites and co-requisites:

No

Recommended optional programme components:

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

Recommended or required reading:

The students of teacher training line take final examinations in two majors (3,5 cr each). The textbooks are:

Inorganic Chemistry. Cotton, F. A., Wilkinson, G. ja Gaus, P. L.: Basic Inorganic Chemistry, 3. painos, Wiley & Sons, 1995.

Physical Chemistry. Atkins P. and De Paula, J., Atkins' Physical Chemistry, Oxford University Press, Oxford, 9. painos (2009) tai uudempi.

Organic Chemistry. Clayden, J., Greeves, N., Warren, S. ja Wothers, P.: Organic Chemistry, Oxford University Press, 2. painos, 2012., (valituin osin).

Structural Chemistry. By separate agreement.

Assessment methods and criteria:

1 Final examination/major

Grading:

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

Person responsible:

Professors

Working life cooperation:

No

Other information:

No

782600S: Final Examination in Physical Chemistry, 7 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

7 credits/187 hours of work

Language of instruction:

Finnish, 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

780683S-02: Final Examination in Physical Chemistry (Teacher), 0 op

Voimassaolo: 01.01.2015 -

Opiskelumuoto: Advanced Studies

Laji: Partial credit

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

7 credits/187 hours of work

Language of instruction:

Finnish

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:

Teachers

Prerequisites and co-requisites:

No

Recommended optional programme components:

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

Recommended or required reading:

The students of teacher training line take final examinations in two majors (3,5 cr each). The textbooks are:

Inorganic Chemistry. Cotton, F. A., Wilkinson, G. ja Gaus, P. L.: Basic Inorganic Chemistry, 3. painos, Wiley & Sons, 1995.

Physical Chemistry. Atkins P. and De Paula, J., Atkins' Physical Chemistry, Oxford University Press, Oxford, 9. painos (2009) tai uudempi.

Organic Chemistry. Clayden, J., Greeves, N., Warren, S. ja Wothers, P.: Organic Chemistry, Oxford University Press, 2. painos, 2012., (valituin osin).

Structural Chemistry. By separate agreement.

Assessment methods and criteria:

1 Final examination/major

Grading:

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

Person responsible:

Professors

Working life cooperation:

No

Other information:

No

784600S: Final Examination in Structural Chemistry, 7 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

7 credits/187 hours of work

Language of instruction:

Finnish, 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

780683S-04: Final Examination in Structural Chemistry (Teacher), 0 op**Voimassaolo:** 01.01.2015 -**Opiskelumuoto:** Advanced Studies**Laji:** Partial credit**Vastuuyksikkö:** Field of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**Voidaan suorittaa useasti:** Kyllä**ECTS Credits:**

7 credits / 187 hours of work

Language of instruction:

Finnish

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:

Teachers

Prerequisites and co-requisites:

No

Recommended optional programme components:

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

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

1 Final examination /major

Grading:

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

Person responsible:

Professors

Working life cooperation:

No

Other information:

No

780114P: General and Inorganic Chemistry I, 6 op**Voimassaolo:** 01.08.2012 -**Opiskelumuoto:** Basic Studies**Laji:** Course**Vastuuyksikkö:** Field 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
780117P	General and Inorganic Chemistry A	5.0 op
780118P	General and Inorganic Chemistry B	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

Contents:

Learning activities and teaching methods:

The course is not lectured any more.

Recommended optional programme components:

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

Recommended or required reading:

Person responsible:

N.N.

780115P: General and Inorganic Chemistry II, 6 op

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field 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
780117P	General and Inorganic Chemistry A	5.0 op
780118P	General and Inorganic Chemistry B	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

Learning outcomes:

Learning activities and teaching methods:

The course is not lectured any more.

Recommended optional programme components:

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

Person responsible:

N.N.

780341A: Industrial Training I, 2 op**Opiskelumuoto:** Intermediate Studies**Laji:** Practical training**Vastuuyksikkö:** Field 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:** Field 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: Field 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>).

780344A: Industrial Training IV, 8 op

Opiskelumuoto: Intermediate Studies

Laji: Practical training

Vastuuyksikkö: Field 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 spezialisation 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>).

780353A: Inorganic Chemistry I, 6 op**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Field of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

781301A Inorganic Chemistry I 5.0 op

780356A Inorganic Chemistry 9.0 op

Voidaan suorittaa useasti: Kyllä**ECTS Credits:**

6 credits/160 hours of work

Language of instruction:

Finnish

Person responsible:

Doc. Raija Oilunkaniemi

Other information:

The course is not lectured any more.

780391A: Inorganic Chemistry II, 4 op**Voimassaolo:** 01.08.2012 -**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Field of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

781302A Inorganic Chemistry II 5.0 op

781642S Inorganic Chemistry II 4.0 op

780356A Inorganic Chemistry 9.0 op

ECTS Credits:

4 credits / 107 hours of work

Learning activities and teaching methods:

The course is not lectured any more.

Person responsible:

Professor Risto Laitinen

Working life cooperation:

No

Other information:

No

781642S: Inorganic Chemistry II, 4 op**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Field of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

781302A Inorganic Chemistry II 5.0 op

780391A	Inorganic Chemistry II	4.0 op
780361A	Inorganic Chemistry II	4.0 op

ECTS Credits:

4 credits/107 hours of work

Learning activities and teaching methods:

The course is not lectured any more.

Person responsible:

Professor Risto Laitinen

Working life cooperation:

No

Other information:

No

781648S: Inorganic Structural Chemistry, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th spring. The course is lectured every other year, next time during the spring 2017.

Learning outcomes:

After this course the student is familiar with molecular symmetry and application of molecular symmetry in vibration spectroscopy, electronic absorption spectroscopy and in multinuclear NMR spectroscopy.

Contents:

Molecular symmetry and group theory, vibrational spectroscopy, electronic absorption spectroscopy and NMR spectroscopy.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

34 hours of lectures, 8 hours of exercises, 92 hours of self-study.

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Inorganic Chemistry I (780353A or 781301A) and Inorganic Chemistry II (780391,781302A, or 781642S)

Recommended optional programme components:

Previous course 781639S Molecular Symmetry and Spectroscopy 5 cr. Contains also parts of the previuos course 781614S Structural Methods in Inorganic Chemistry 3 cr.

Recommended or required reading:

Rankin, D. W. H., Mitzel, N, W, ja Morrison, C. A., Structural Methods in Molecular Inorganic Chemistry, John Wiley & Sons, Ltd., Chichester, 2013.

Assessment methods and criteria:

The assessment of the course is based on the final examination. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

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

Person responsible:

Doc. Raija Oilunkaniemi

Working life cooperation:

No

Other information:

No

780328A: Instrumental Analysis, 4 - 5 op**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Field of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Paavo Perämäki**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

781308A	Instrumental Analysis	5.0 op
780324A	Analytical Chemistry II	4.0 op

ECTS Credits:

4 credits /107 hours of work

Learning activities and teaching methods:

The course is not lectured any more.

Person responsible:

Prof. Paavo Perämäki and Doc. Sampo Mattila

780111P: Introduction to Analytical Chemistry, 4 op**Opiskelumuoto:** Basic Studies**Laji:** Course**Vastuuyksikkö:** Field of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Paavo Perämäki**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

780119P	Introduction to Analytical Chemistry	5.0 op
780110P	Analytical Chemistry I	5.5 op

ECTS Credits:

4 credits /107 hours of work

Learning activities and teaching methods:

The course is not lectured any more.

Person responsible:

Prof. Paavo Perämäki

780103P: Introduction to Organic Chemistry, 6 op**Opiskelumuoto:** Basic Studies**Laji:** Course**Vastuuyksikkö:** Field of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Johanna Kärkkäinen**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

780116P	Introduction to Organic Chemistry	5.0 op
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

Learning activities and teaching methods:

The course is not lectured any more.

Grading:

T

Person responsible:

Ph.D. Johanna Kärkkäinen

780112P: Introduction to Organic Chemistry, 4 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Johanna Kärkkäinen

Opintokohteen kielet: Finnish

Leikkaavuudet:

780116P Introduction to Organic Chemistry 5.0 op
 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

Learning activities and teaching methods:

The course is not lectured any more.

Person responsible:

Ph.D. Johanna Kärkkäinen

780122P: Introductory Laboratory Course in Chemistry, 3 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

780127P Introductory Laboratory Works 5.0 op

ECTS Credits:

3 credits/80 hours of work

Learning outcomes:

Learning activities and teaching methods:

The course is not arranged any more as a 3 credits course. The new course is 780123P Introductory Laboratory Works in Chemistry 5 cr.

Person responsible:

Ph.D. Teija Kangas

780123P: Introductory Laboratory Works in Chemistry, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

780127P Introductory Laboratory Works 5.0 op

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

Finnish

Timing:

1st autumn or 1st spring

Learning outcomes:

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

Contents:

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

Mode of delivery:

Supervised laboratory work, independently done preparatory problems.

Learning activities and teaching methods:

Safety in laboratory 2 hours, 40 hours of laboratory work + demonstrations + problems, 92 hours of self-study.

Target group:

Biochemistry, 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 (780120P, 5cr) or Basic Principles in Chemistry (780109P, 4 cr) or General and Inorganic Chemistry A (780117P, 5 cr). Student is allowed to participate to the course simultaneously when participating the prerequisites. Attendance at the lecture of Safety in laboratory is compulsory.

Recommended optional programme components:

Participation in the courses Basic Principles of Chemistry (780123P, 5 cr), General and Inorganic Chemistry A (780117P, 5 cr) and Introduction to Organic Chemistry (780116P, 5 cr).

Recommended or required reading:

Instruction Book (in Finnish): Kemian perustyöt 780123P

Assessment methods and criteria:

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

Grading:

The course utilizes verbal grading scale pass/fail.

Person responsible:

Ph.D. Teija Kangas

Working life cooperation:

No

Other information:

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

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

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Leena Kaila

Opintokohteen kielet: Finnish

ECTS Credits:

7credits /187 hours of work

Timing:

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

Part 2 (780330A-02): 2nd spring

Learning activities and teaching methods:

The course is not any more in the syllabus.

Person responsible:

PhD Matti Niemelä

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

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Minna Tiainen

Opintokohteen kielet: Finnish

Leikkaavuudet:

780127P Introductory Laboratory Works 5.0 op

ECTS Credits:

2 credits/ 53 hours of work

Learning activities and teaching methods:

The course is not any more in the syllabus.

Person responsible:

Lecturer M. Tiainen

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

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Leena Kaila

Opintokohteen kielet: Finnish

ECTS Credits:

5 credits/134 hours of work

Learning activities and teaching methods:

The course is not in the syllabus any more. Instead of this course there is the course 780354A Laboratory Works in Inorganic Chemistry I, 5 cr.

Person responsible:

PhD Matti Niemelä

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

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

781320A Bachelor's Thesis 9.0 op

ECTS Credits:

2 credits/53 hours of work

Learning activities and teaching methods:

The course is included in the new course 781320A Bachelor's Thesis 9 cr.

781627S: Main Group Chemistry, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Laitinen Risto

Opintokohteen kielet: Finnish

ECTS Credits:

5 credits/134 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th or 5th year. The course is given every other year, next time duoring the autumn 2015.

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, semimetals and non-metals. The content of the course varies.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

28 hours of lectures, 14 hours of exercises, 92 hours of self-study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Inorganic Chemistry I (780353A or 781301A) and Inorganic Chemistry II (780391A, 781302A tai 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:

Overton, T., Rourke, J., Weller, M. ja Armstrong, F.: Inorganic Chemistry, 6. painos, Oxford University Press, Oxford 2014. Chapters 9-18. Material handed out by the 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:

Prof. Risto Laitinen

Working life cooperation:

No

Other information:

No

781651S: Metrological Fundamentals of Analytical Chemistry, 5 op**Voimassaolo:** 01.08.2015 -**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Field of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**ECTS Credits:**

5 credits /134 hours of work

Language of instruction:

Finnish

Timing:

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

Learning outcomes:

Upon completion of the course, student should have acquired knowledge and understanding of most common statistical techniques that are applied in validation of analytical methods and in quality control in analytical laboratories.

Contents:

Significance tests, analysis of variance, regression methods, measurement uncertainty, validation and optimization of analytical methods.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

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

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Introduction to Analytical Chemistry (780111P or 780119P)

Recommended optional programme components:

Previous 781631S Statistical Methods in Analytical Chemistry 4 credits

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

Recommended or required reading:

Massart, D. L., Vandeginste, B.G.M., Buydens, L.M.C., De Jong, S., Lewi, P.J. and Smyers-Verbeke, J.: Handbook of Chemometrics and Qualimetrics: Part A, Elsevier, 1997, partly.

Assessment methods and criteria:

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

Grading:

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

Person responsible:

Prof. Paavo Perämäki

Working life cooperation:

No

Other information:

No

784641S: NMR-workshop I, 5 op**Voimassaolo:** 01.08.2015 -**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Field of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th autumn or spring.

Learning outcomes:

After this course the student is familiar with the common 1D and 2D NMR methods, their principles, and usage in structure elucidation of an unknown sample

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, 24 hours of software training, 80 hours of exercises on spectrometer, 10 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

784642S: NMR-workshop II, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th spring.

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. Analysis of Natural Products and NMR spectroscopy of biological samples

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, 24 hours of measurement and analysis of unknown sample, 10 hours of self-study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

NMR Workshop I (784623S or 784641S)

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

780389A: Organic Chemistry I, 6 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Hormi Osmo

Opintokohteen kielet: Finnish

Leikkaavuudet:

781305A Organic Chemistry I 5.0 op

780385A Organic Chemistry I 9.0 op

ECTS Credits:

6 credits/160 hours of work

Learning outcomes:

Learning activities and teaching methods:

The course is not lectured any more.

Person responsible:

N.N.

780393A: Organic Chemistry II, 4 op

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

781306A Organic Chemistry II 5.0 op

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:**Learning outcomes:****Contents:****Learning activities and teaching methods:**

The course is not lectured any more.

Prerequisites and co-requisites:**Recommended or required reading:****Person responsible:**

Ph.D. Juha Heiskanen

783643S: Organic Chemistry II, 4 op**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Field of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

781306A	Organic Chemistry II	5.0 op
780393A	Organic Chemistry II	4.0 op
780390A	Organic Chemistry II	4.0 op

ECTS Credits:

4 credits/107 hours of work

Learning activities and teaching methods:

The course is not lectured any more.

Person responsible:

Ph.D. Juha Heiskanen

783639S: Organic Chemistry III, 5 op**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Field 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:

3rd autumn-

Learning outcomes:

After this course, the student is familiar with various organic chemistry reactions, can profoundly explain and analyze mechanisms, and predict reaction outcome.

Contents:

Fixed chapters from the textbook

Mode of delivery:

Self-study

Learning activities and teaching methods:

134 hours of self study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Organic Chemistry I (780389A or 781305A) and Organic Chemistry II (780393A/783643S or 781306A)

Recommended optional programme components:

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

Recommended or required reading:

Clayden, J., Greeves, N., Warren, S., Wothers, P.: Organic Chemistry, Oxford University Press, 2001 or Clayden, J., Greeves, N., Warren, S.: Organic Chemistry, Oxford University Press, 2nd edition, 2012.

Assessment methods and criteria:

Contact the responsible teacher to arrange the final examination.

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

Grading:

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

Person responsible:

PhD Juha Heiskanen and PhD Johanna Kärkkäinen

Working life cooperation:

No

Other information:

No

780347A: Physical Chemistry I, 6 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Pursiainen Jouni

Opintokohteen kielet: Finnish

Leikkaavuudet:

781303A	Physical Chemistry I	5.0 op
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

782631S: Physical Chemistry II, 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Perttu Lantto

Opintokohteen kielet: Finnish

Leikkaavuudet:

781304A	Physical Chemistry II	5.0 op
780392A	Physical Chemistry II	4.0 op
780349A	Physical Chemistry II	4.0 op

ECTS Credits:

4 credits/107 hours of work

Learning activities and teaching methods:

The course is not lectured any more.

Person responsible:

Ph.D. Perttu Lantto

780392A: Physical Chemistry II, 4 op

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Perttu Lantto

Opintokohteen kielet: Finnish

Leikkaavuudet:

781304A	Physical Chemistry II	5.0 op
782631S	Physical Chemistry II	4.0 op
780319A	Physical Chemistry III	6.5 op

ECTS Credits:

4 credits / 107 hours of work

Contents:

Learning activities and teaching methods:

The course is not lectured any more.

Prerequisites and co-requisites:

Recommended or required reading:

Person responsible:

Dh.D. Perttu Lantto

782623S: Research Seminar in Physical Chemistry, 2 op

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field 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

780301A-01: Research Training, 3 op

Voimassaolo: 01.08.2006 -

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

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:

PhD Matti Niemelä

Working life cooperation:

No

Other information:

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

780301A-03: Research Training, 3 op

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Field 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:

Three different syntheses and qualitative analysis of a mixture of three unknown compounds. 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), 55 h/ laboratory of supervised, independent laboratory work and 23h/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, 2nd edition, 2012.

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:

PhD 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.

780301A-02: Research Training, 3 op

Voimassaolo: 01.08.2006 -

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Anne Heponiemi

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:

E.g. conductivity of an electrolytic solution, adsorption from solution, rate of chemical reaction, and surface tension.

Mode of delivery:

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

Learning activities and teaching methods:

2 hours of lectures of safety at work (obligatory), 42 hours of laboratory experiments. Additionally, written laboratory reports, one per laboratory work (36 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:

Preliminary plan of laboratory work, 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. Anne Heponiemi

Working life cooperation:

No

Other information:

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

781649S: Sampling and Sample Pretreatment, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

Finnish. English on demand.

Timing:

4th or 5th spring. The course is lectured every other year, next time during the spring 2017.

Learning outcomes:

After this course student becomes aware of the importance of correct sampling (especially heterogeneous solid materials). The student also gets knowledge how to i) sample and ii) prepare samples for various types of analysis: determination of total element concentrations (incl. ultra trace levels), fractionation of elements and element speciation analysis. At the end of the course the students should have also acquired an understanding of the techniques that are used in sample preconcentration and matrix separation, as well as purification of reagents and laboratory tools when very low element concentrations are measured.

Contents:

Representative sampling and sampling errors, various sample preparation techniques utilizing open and closed systems and their use in the determination of total element concentrations in inorganic and organic sample types. Fusion techniques and fire assay methods. Sample preparation in trace element fractionation and speciation analysis. Systematic errors in analysis (losses and contamination), clean rooms, separation and preconcentration techniques.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

30 hours of lectures + seminar presentation + 103 hours of self-study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Introduction to Analytical Chemistry (780111P or 780119P)

Recommended optional programme components:

Previous courses 781640S Sampling and Sample Preparation 4 cr and 781632S Determination of Trace Elements 3 cr combined.

Recommended or required reading:

Sirén, H., Perämäki, P., Laiho, J.: Esikäsittelyn käsikirja, Kemian Kustannus Oy, 2009 and material handed out by the lecturer.

Assessment methods and criteria:

Final examination or home assignment. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

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

Person responsible:

Prof. Paavo Perämäki

Working life cooperation:

No

Other information:

No

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

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

781320A Bachelor's Thesis 9.0 op

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.

781652S: Solid State Chemistry, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th or 5th autumn. The course is lectured every other year, next time during the autumn 2016.

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 external 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:

32 hours of lectures, 102 hours of self-study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Physical Chemistry I (780347A or 781303A), Inorganic Chemistry I (780353A or 781301A), and Inorganic Chemistry II (780391A or 781302A)

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.: Solid State Chemistry and its Applications, 2nd Ed., John Wiley & Sons, Chichester, 2014

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

784640S: Structural Chemistry I, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Mattila, Sampo Antero

Opintokohteen kielet: Finnish

Leikkaavuudet:

780317A Structural Chemistry I 5.0 op

ECTS Credits:

5 credits/134 hours of work

Language of instruction:

Finnish

Timing:

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

Learning outcomes:

After this course the student is familiar with the basics of interpretation of IR, NMR and mass spectra in identification, structure elucidation and quantification of organic molecules.

Contents:

Principles of chromatography, the interpretation of IR, NMR and mass spectra and methods of problem solving with the aid of IR, NMR and mass spectra.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

40 hours of lectures, 20 hours of demonstrations and exercises, 74 hours of work Approximately $\frac{1}{4}$ of the course is in the scope of quantitative analysis and approximate $\frac{3}{4}$ qualitative analysis.

Target group:

Chemistry

Prerequisites and co-requisites:

No specific prerequisites

Recommended optional programme components:

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

Recommended or required reading:

Williams, D.H. & Fleming, I.: Spectroscopic Methods in Organic Chemistry, 5th ed., McGraw-Hill, Avon, 1995.

Assessment methods and criteria:

Final examination, exercises and tasks during the course

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

Grading:

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

Person responsible:

Lecturer Sampo Mattila

Working life cooperation:

No

Other information:

No

781658S: Surface Analytical Techniques, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

Finnish/English on demand

Timing:

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

Learning outcomes:

Upon completion the student should have acquired knowledge and understanding of function of techniques and applications of them.

Contents:

Field emission scanning electron microscope, Energy filtered transmission electron microscope, Computer controlled electron probe microanalyzer and X-ray photoelectron spectroscopy, sample preparation, applications.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

50 hours of lectures, portfolio 10 hours, essay 10 hours, self-study 64 hours

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Inorganic Chemistry I (780353A or 781301A)

Recommended optional programme components:

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

Recommended or required reading:

Brandon & Kaplan, Microstructural Characterization on Materials, Wiley, 2008

Assessment methods and criteria:

Problem based learning. This course unit utilizes continuous assessment. The students will be compiling a learning diary all through the course unit, and write a essay. Learning diary and essay will be assessed. The assessment of the course unit is based on the learning outcomes of the course unit. Attendance is compulsory. Read more about [assessment criteria](#) at the University of Oulu webpage.

Grading:

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

Person responsible:

Lecturer Minna Tiainen

Working life cooperation:

No

Other information:

No

782637S: Surface Chemistry, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th or 5th autumn. The course is lectured every other year, next time during the autumn 2017.

Learning outcomes:

Upon completion of the course, the student will be able to explain the essential phenomena of surface chemistry, such as surface tension, interfaces and surface reactions. The student knows the properties of liquid surfaces and interfaces, and the role of surface active agents. The student will be able to explain properties of surfaces and surface phenomena. The student knows the most important surface structures and methods used in surface science studies. Surface phenomena are significant in several industrial applications, and those applications are theoretically studied during the course.

Contents:

Properties of liquid-gas, liquid-liquid, solid-gas and solid-liquid interfaces. Surface structures, Surface phenomena and Surface analytical methods. A wide range of applications are considered on molecular level, such as emulsions, foams, flotation, nucleation, surface active agents.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

50 hours of lectures, 84 hours of self-study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Physical Chemistry I and Physical Chemistry II

Recommended optional programme components:

Previous courses Surface Chemistry I and Surface Chemistry II

Recommended or required reading:

Adamson, A.W.: Physical Chemistry of Surfaces, 6. painos, John Wiley & Sons, New York, 1997 (partly); Somorjai, G.A.: Introduction to Surface Chemistry and Catalysis, John Wiley & Sons, New York, 1994 (partly). Final examination is based on the lectures.

Assessment methods and criteria:

Final Examination

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

Grading:

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

Person responsible:

Prof. Ulla Lassi

Working life cooperation:

No

Other information:

No

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

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

781320A Bachelor's Thesis 9.0 op

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>).

781655S: X-Ray Crystallography, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th or 5th autumn. The course is lectured every other year, next time during the autumn 2015 and 2017.

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, powder samples and Rietveld refinement.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

32 hours of lectures, 12 hours of demonstrations, 90 hours of self-study (including practical exercise with a written report)

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Inorganic Chemistry I (780353A or 781301A), Inorganic Chemistry II (780391A, 781302A or 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:

Massa, W.: Crystal Structure Determination, 2nd Ed., Springer, Berlin, 2004.

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