Opasraportti

LuTK - Chemistry 2011-2012 (2011 - 2012)

Degree Programme in Chemisty

The Bachelor's Degree in Chemistry and The Master's Degree in Chemistry

The Bachelor's Degree in Chemistry

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

General Studies	10
Basic Studies	25
Intermediate Studies	65
Minor Subject Studies, from which	50
- Biochemistry a minimum 5 cr	
- Physics and Mathematics *together* a minimum 25 cr	
Optional studies	30
All together a minimum	**180 cr**

Compulsory courses for B.Sc. Degree

General studies/General Studies in Chemistry 10 cr	**Cr**	**Code**	**Semester**

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

Chemistry 90 cr			
Basic Studies 25 cr	**Cr**	**Code**	**Semester**
Introduction to Analytical Chemistry	4	780111P	1st spring
Introduction to Chemistry	12	780113P	1st autumn
Introduction to Organic Chemistry	6	780103P	1st autumn-1st spring
Introductory Laboratory Course	3	780122P	1st autumn

Intermediate Studies (35 cr + 15 cr + 15 cr) **65 cr**	**Cr**	**Code**	**Semester**
Inorganic Chemistry I	6	780353A	2nd spring
Laboratory Course I in Inorganic Chemistry	7	780330A	1st spring+2nd spring
Physical Chemistry I	6	780347A	2nd autumn
Laboratory Course I in Physical Chemistry	5	780331A	2nd autumn
Chemical Legislation in Finland	1	780321A	3rd autumn

Organic Chemistry I	6	780389A	2nd autumn
Laboratory Course I in Organic Chemistry	4	780329A	2nd autumn
Instrumental Analysis	5	780328A	3rd autumn
Introduction to Polymer Chemistry	2	780326A	1st spring
Structural Chemistry I	5	780317A	3rd autumn
Environmental Chemistry	3	780373A	3rd autumn
Thesis for the Degree of B.Sc.	6	780300A	3rd autumn-3rd spring
Research Training	9	780301A	3rd autumn-3rd spring

Minor Subject Studies 50 cr	**Cr**	**Code**	**Semester**
Biochemistry a minimum 5 cr			
Biomolecules	5	740148P	2nd autumn-2nd spring
Physics and Mathematics together a minimum 25 cr			
Introduction to Mathematical Deduction	5	802151P	1st autumn

Optional Studies 30 cr

The Master's Degree in Chemistry

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

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

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

Chemistry 104 cr			
Advanced Studies 104 cr	**Cr**	**Code**	**Semester**
Inorganic Chemistry II	4	781642S	4th autumn
Physical Chemistry II	4	782631S	4th autumn
Organic Chemistry II	4	783643S	4th autumn
Seminars	4	780690S	5th spring
Research Project	12	780601S	4th autumn-4th spring
A Survey of Literature	9	78x605S	5th autumn-5th spring
Maturity test	0	780699S	5th spring
Master Thesis of the orientation area	38	78x601S	5th autumn-5th spring
Final examination of the orientation area	7	78x600S	5th spring
Optional Advanced Studies of Chemistry	22		

Optional Studies 16 cr

The Bachelor's Degree in Subject Teacher Specialization and The Master's Degree in Subject Teacher Specialization

The Bachelor's Degree in Chemistry (Subject Teacher)

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

General Studies	10
Basic Studies	25
Intermediate Studies	60
The other teaching Subject (Physics, Mathematics or Information technology)	40-50
Pedagogical Studies	25
Optional Studies	20-10
All together a minimum	**180 cr**

Compulsory courses for B.Sc. Degree

General studies/General Studies in Chemistry 10 cr	**Cr**	**Code**	**Semester**
Orientation Course for New Students (Chemistry today, tutorial, HOPS)	1	780078Y	1st autumn-1st spring
English 1	2	902002Y	1st autumn
English 2	2	902004Y	2nd spring
Literature of Chemistry and Communication Skills	2	780379A	2nd autumn+3rd autumn

Maturity test	0	780381A	3rd spring
Swedish	2	901004Y	1st spring
Seminar for the Degree of B.Sc.	1	780380A	3rd spring

Chemistry 85 cr			
Basic Studies 25 cr	**Cr**	**Code**	**Semester**
Introduction to Analytical Chemistry	4	780111P	1st spring
Introduction to Chemistry	12	780113P	1st autumn
Introduction to Organic Chemistry	6	780103P	1st autumn-1st spring
Introductory Laboratory Course	3	780122P	1st autumn

Intermediate Studies (35 cr + 8 cr + 2 cr + 15 cr) **60 cr**	**Cr**	**Code**	**Semester**
Inorganic Chemistry I	6	780353A	2nd spring
Laboratory Course I in Inorganic Chemistry	7	780330A	1st spring+2nd spring
Physical Chemistry I	6	780347A	2nd autumn
Laboratory Course I in Physical Chemistry	5	780331A	2nd autumn
Chemical Legislation in Finland	1	780321A	3rd autumn
Organic Chemistry I	6	780389A	2nd autumn
Laboratory Course I in Organic Chemistry	4	780329A	2nd autumn
Structural Chemistry I	5	780317A	3rd autumn
Environmental Chemistry	3	780373A	3rd autumn

Demonstrations in Physics and Chemistry	2	780396A	3rd autumn
Thesis for the Degree of B.Sc.	6	780300A	3rd autumn-3rd spring
Research Training	9	780301A	3rd autumn-3rd spring

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

Pedagogical Studies 25 cr

Optional Studies 20-10 cr

The Master's Degree in Subject Teacher Specialization

Studies for M.Sc.Degree (120 cr)

Advanced Studies in Chemistry 60 cr	**Cr**	**Code**	**Semester**
Inorganic Chemistry II	4	781642S	4th autumn
Physical Chemistry II	4	782631S	4th autumn
Organic Chemistry II	4	783643S	4th autumn

Maturity test	0	780699S	5th spring
Master Thesis of the orientation area	20	78x601S	5th autumn-5th spring
Final examination of the orientation area	7	78x600S	5th spring
Optional Advanced Studies of Chemistry	21		

The other Teaching Subject 20-10 cr
Physics or
Mathematics or
Information technology

Pedagogical Studies 35 cr

Optional Studies 5-15 cr

Chemistry as a minor subject

Chemistry 25 cr:

Subject teachers

Introduction to Chemistry (780113P), 12 cr

Introduction to Organic Chemistry (780103P), 6 cr

Introductory Laboratory Course (780122P), 3 cr

Introduction to Analytical Chemistry (780111P), 4 cr

Others

Introduction to Chemistry (780113P), 12 cr

Introduction to Organic Chemistry (780103P), 6 cr

Introduction to Analytical Chemistry (780111P), 4 cr

Environmental Chemistry (780373A), 3 cr

Chemistry 60 cr:

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

Inorganic Chemistry I (780353A), 6 cr

Physical Chemistry I (780347A), 6 cr

Organic Chemistry I (780389A), 6 cr

And at least one of the followings:

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

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

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

And optional Intermediate Studies in Chemistry

Chemistry 120cr:

Chemistry 60 cr

Advanced Studies in Chemistry 60 cr

A record of Chemistry as a minor subject will be given when the amount of accepted studies is at least 15 credits.

Tutkintorakenteisiin kuulumattomat opintokokonaisuudet ja -jaksot

300003Y: Activities in university and student organizations, 1 - 4 op
783633S: Adhesion Chemistry, 3 op
300002M: Advanced Information Skills, 1 op
781625S: Aquatic Chemistry, 4 op
782626S: Atmospheric Chemistry, 3 - 4 op
781637S: Atomic Spectrometric Methods, 4 op
780109P: Basic Principles in Chemistry, 4 op
780372A: Basic Principles of Green Chemistry, 4 op
782625S: Basic Principles of Quantum Chemistry, 3 - 4 op
784637S: Biological NMR Spectroscopy, 3 op
782621S: Catalysis, 3 op
782627S: Chemical Applications in Hazardous Waste Management and Environmental Technology, 4 op
780321A: Chemical Legislation in Fnland, 1 op

780395A: Chemistry for Teachers, 4 op
782634S: Chemistry in industrial applications, 3 op
781610S: Chemistry of Metal Complexes, 3 op
783627S: Chemistry of Natural Substances I, 3 op
783641S: Chemistry of Natural Substances II, 3 op
781621S: Chemistry of Non-Metals, 3 op
783635S: Chemistry of Paints and Surface Coatings, 3 op
781613S: Chemistry of Rare Earth Elements, 3 op
781645S: Chemistry of Solid Fuels Ashes, 3 op
781644S: Computational Inorganic Chemistry, 3 op
784626S: Computer Analysis of NMR Spectra, 2 op
780396A: Demonstrations in Physics and Chemistry, 2 op
781632S: Determination of Trace Elements, 3 op
780373A: Environmental Chemistry, 3 op
781633S: Experimental Design, 4 op
781600S: Final Examination in Inorganic Chemistry, 7 op
783600S: Final Examination in Organic Chemistry, 7 op
782600S: Final Examination in Physical Chemistry, 7 op
784600S: Final Examination in Structural Chemistry, 7 op
782618S: High Pressure Kinetics, 3 op
781638S: ICP-MS Workshop, 3 op
780341A: Industrial Training I, 2 op
780342A: Industrial Training II, 4 op
780343A: Industrial Training III, 6 op
780344A: Industrial Training IV, 8 op
780353A: Inorganic Chemistry I, 6 op
781642S: Inorganic Chemistry II, 4 op
780328A: Instrumental Analysis, 4 - 5 op
782629S: Interactions between Molecules, 4 op
780111P: Introduction to Analytical Chemistry, 4 op
780113P: Introduction to Chemistry, 12 op
783638S: Introduction to Fiber Chemistry of Polysaccharides, 3 op
780102P: Introduction to Inorganic Chemistry, 5 op
780103P: Introduction to Organic Chemistry, 6 op
780112P: Introduction to Organic Chemistry, 4 op
780101P: Introduction to Physical Chemistry, 7 op
780326A: Introduction to Polymer Chemistry, 2 op
780122P: Introductory Laboratory Course in Chemistry, 3 op
780697S: Laboratory Course (Teachers), 20 op
780330A: Laboratory Course I in Inorganic Chemistry, 7 op
Compulsory
780330A-01: Laboratory Course I in Inorganic Chemistry (1. part), 2 op
780330A-02: Laboratory Course I in Inorganic Chemistry (2. part), 5 op
780329A: Laboratory Course I in Organic Chemistry, 4 op
780332A: Laboratory Course I in Organic Chemistry, 4 op
780331A: Laboratory Course I in Physical Chemistry, 5 op
780382A: Laboratory Course in Physical Chemistry (TECH), 2 op
781641S: Laboratory Course in Synthetic Inorganic Chemistry, 4 op
783605S: Literature Survey in Organic Chemistry, 9 op
780379A: Literature of Chemistry and Communication Skills, 2 op
781627S: Main Group Chemistry, 5 op
781601S: Master's Thesis in Inorganic Chemistry, 38 op
781602S: Master's Thesis in Inorganic Chemistry, 20 op
783601S: Master's Thesis in Organic Chemistry, 38 op
783602S: Master's Thesis in Organic Chemistry, 20 op
782601S: Master's Thesis in Physical Chemistry, 38 op
782602S: Master's Thesis in Physical Chemistry, 20 op
784601S: Master's Thesis in Structural Chemistry, 38 op
784602S: Master's Thesis in Structural Chemistry, 20 op
780699S: Maturity Test, 0 op
780381A: Maturity test, 0 op
782624S: Molecular Modelling, 3 - 4 op
781626S: Molecular Modelling Workshop, 3 - 4 op
781639S: Molecular Symmetry and Spectroscopy, 5 op

784617S: Multinuclear NMR Spectroscopy in Structure Elucidation, 4 op
784610S: NMR Spectroscopy in Organic Chemistry, 3 op
784636S: NMR Spectroscopy of Polymers, 4 op
784623S: NMR Workshop I, 4 op
784624S: NMR Workshop II, 4 op
784638S: NMR Workshop III, 4 op
784639S: NMR Workshop IV, 4 op
780389A: Organic Chemistry I, 6 op
783643S: Organic Chemistry II, 4 op
783639S: Organic Chemistry III, 5 op
783614S: Organic Chemistry of Drug Compounds, 3 op
783640S: Organometallic Chemistry, 3 op
780078Y: Orientation Course for New Students, 1 op
783645S: Pericyclic chemistry, 3 op
780347A: Physical Chemistry I, 6 op
782631S: Physical Chemistry II, 4 op
783620S: Polymer Chemistry, 3 op
783636S: Polymer Chemistry in Materials Sciencies, 3 - 4 op
781623S: Reaction Mechanisms in Inorganic Chemistry, 3 op
780601S: Research Project, 12 op
783634S: Research Seminar in Organic Chemistry, 2 op
787602J: Research Seminar in Organic and Polymer Chemistry, 3 op
780301A: Research Training, 9 op
Compulsory
780301A-01: Research Training, 3 op
780301A-02: Research Training, 3 op
780301A-03: Research Training, 3 op
781640S: Sampling and Sample Preparation, 4 op
781647S: Scanning electron microscopy, 3 op
780690S: Seminar, 3 op
780380A: Seminar for the Degree of B.Sc., 1 op
782623S: Seminar in Physical Chemistry, 2 op
788602S: Seminar in Structural Chemistry, 2 op
781611S: Solid State Chemistry, 4 op
781631S: Statistical Methods in Analytical Chemistry, 4 op
780317A: Structural Chemistry I, 5 op
781614S: Structural Methods in Inorganic Chemistry, 3 op
782620S: Surface Chemistry I, 3 op
782633S: Surface chemistry II, 3 op
781630S: Symposium in inorganic and analytical chemistry, 2 op
783642S: Synthetic Methods in Green Chemistry, 4 op
780300A: Thesis for the Degree of B.Sc., 6 op
780079Y: Tutoring, 1 op
783619S: Wood Chemistry, 3 op
781646S: X-Ray Chrystallography, 6 op

Opintojaksojen kuvaukset

Tutkintorakenteisiin kuulumattomien opintokokonaisuuksien ja -jaksojen kuvaukset

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

Voimassaolo: 01.01.2010 -
Opiskelumuoto: General Studies

Laji: Course
Vastuuyksikkö: Faculty of Science
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish
Voidaan suorittaa useasti: Kyllä

Ei opintojaksokuvauksia.

783633S: Adhesion Chemistry, 3 op

Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Department of Chemistry
Arvostelu: 1 - 5, pass, fail
Opettajat: Hormi Osmo
Opintokohteen kielet: Finnish

ECTS Credits:
3 credits
Language of instruction:
Finnish/English on demand.
Timing:
4th or 5th autumn. The course is lectured every other year, next time during the spring 2012.
Learning outcomes:
After passing the course the student can explain the composition of an adhesive formulation and can also explain the basics of adhesion theory.
Contents:
Adhesion theory, surface treatment methods, thermoplastic block copolymers, polyurethanes, poly(vinyl acetate), acrylates, anaerobic adhesives, cyanoacrylates.
Learning activities and teaching methods:
24 hours of lectures
Target group:
Chemistry, optional
Recommended optional programme components:
Introduction to Polymer Chemistry (780326A) and Physical Chemistry of Surfaces (782620S)
Recommended or required reading:
Skeits, I.: Handbook of Adhesives, 3rd ed., Van Nostrand Reinhold, New York, 1990.
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Prof. Osmo Hormi

300002M: Advanced Information Skills, 1 op

Voimassaolo: 01.08.2009 -
Opiskelumuoto: Other Studies
Laji: Course
Vastuuyksikkö: Faculty of Science
Arvostelu: 1 - 5, pass, fail
Opettajat: Sassali, Jani Henrik
Opintokohteen kielet: Finnish

ECTS Credits:
1 ECTS credit

Language of instruction:
Finnish
Timing:
Recommend to degree students who are working on their diploma/master's thesis. The course unit is held once in the autumn and once in the spring semester.
Learning outcomes:
Students know the different phases of scientific information retrieval process and basic techniques of systematic information search. They will find the most important reference databases of their discipline and know how to evaluate information sources and search results.

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

Mode of delivery:
Blended teaching: lectures, web-based learning material and exercises in Optima environment, personal guidance
Learning activities and teaching methods:
Lectures 6h, self-study 20h, personal guidance 1h
Recommended or required reading:
Parts from the following chapters of the Toolbox of Research: https://wiki.oulu.fi/display/tor/1.1+Finding+scientific+information
https://wiki.oulu.fi/display/tor/1.3.1+Evaluation+based+on+academic+publishing

Assessment methods and criteria:
Passing the course requires participation in the lectures (6h) and personal guidance and successful completion of the course assignments.
Grading:
pass/fail
Person responsible:
Science and Technology Library Tellus, tellustieto (at) oulu.fi
Other information:
http://www.kirjasto.oulu.fi/index.php?id=1250

781625S: Aquatic Chemistry, 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Leena Kaila

Opintokohteen kielet: Finnish

ECTS Credits:
4 credits
Language of instruction:
Finnish/English on demand
Timing:
4th or 5th spring. The course is lectured every other year, next time during the spring 2012.
Learning outcomes:
After this course the student should understand chemistry of natural waters: chemical equilibrium and reaction rates in them. Models of natural waters, influences of pollution on them.
Contents:
Atmosphere-water-solid-interactions and regulation of the chemical composition of natural waters.
Learning activities and teaching methods:
32 hours of lectures
Target group:
Chemistry, optional
Recommended optional programme components:
Introduction to Analytical Chemistry (780111P)
Recommended or required reading:

Stumm, W. and Morgan, J.J.: Aquatic Chemistry - Chemical Equilibria and Rates in Natural Waters, 3rd ed., John Wiley & Sons, New York, 1995; Buffle, J.: Complexation Reactions In Aquatic Systems: An Analytical Approach, Ellis Horwood Limited, Chichester, 1988.
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Lecturer Leena Kaila

782626S: Atmospheric Chemistry, 3 - 4 op

Voimassaolo: - 21.07.2010

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Laasonen Kari

Opintokohteen oppimateriaali:
Seinfeld, John H., , 1998
Opintokohteen kielet: Finnish

ECTS Credits:
3 credits
Language of instruction:
Finnish/English on demand.
Timing:
4th autumn. The course is lectured every other year.
Learning outcomes:
After completing this course the students should have good knowledge of the physical chemistry of several atmospheric processes including the ozone depletion, acid rain and greenhouse gases.
Contents:
The course concentrates on atmospheric phenomena, especially the physical chemistry related to atmospheric pollutions. Topics include: the chemical reaction on different parts of atmosphere (including ozone depletion, atmospheric sulphur chemistry), aerosols, formation of small droplets and their impurities, acid rain and global warming.

Learning activities and teaching methods:
30 hours of lectures, one final examination.
Target group:
Chemistry, optional.
Recommended optional programme components:
Physical Chemistry I (780347A) and Physical Chemistry II (782631S) or P.W. Atkins, Physical Chemistry, part 3.
Recommended or required reading:
Material given by the lecturer (in Finnish) and Seinfeld, J.H. and Pandis, S. N.: Atmospheric Chemistry and Physics, Willey-Interscience, 1998.
Person responsible:
Prof. K. Laasonen

781637S: Atomic Spectrometric Methods, 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Paavo Perämäki

Opintokohteen kielet: Finnish

ECTS Credits:
4 credits
Language of instruction:
Finnish
Timing:
4th or 5th autumn. The course is lectured every other year, next time during the autumn 2012.
Learning outcomes:
Upon completion of the course, student should have acquired knowledge and understanding of modern AAS and ICP-OES techniques and their advantages and "weak points" in the point of view of elements and samples to be analyzed.
Contents:
Theoretical background of the different atomic spectrometric techniques (atomic absorption spectrometry, atomic emission spectrometry employing plasma sources, plasma mass spectrometry), modern instrumentation and determination of various elements, interference effects and their correction, optimization of the determination procedures, instrument diagnostics.
Learning activities and teaching methods:
30 hours of lectures + seminar + practical exercise
Target group:
Chemistry, optional
Recommended optional programme components:
Instrumental Analysis (780328A)
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
Grading:
1-5/fail
Person responsible:
Prof. Paavo Perämäki

780109P: Basic Principles in Chemistry, 4 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Minna Tiainen

Opintokohteen kielet: Finnish

Leikkaavuudet:

780120P	Basic Principles in Chemistry	5.0 op
ay780117P	General and Inorganic Chemistry A (OPEN UNI)	5.0 op
780115P	General and Inorganic Chemistry II	6.0 op
780114P	General and Inorganic Chemistry I	6.0 op
780113P	Introduction to Chemistry	12.0 op
780101P	Introduction to Physical Chemistry	7.0 op
780101P2	Physical Chemistry I	4.0 op
780107P	Basic Course in Inorganic and Physical Chemistry	7.5 op
780152P	Inorganic and Physical Chemistry I	7.5 op
780153P	General and Inorganic Chemistry	7.5 op
780154P	Basic Inorganic Chemistry	7.5 op

ECTS Credits:
4 credits
Language of instruction:
Finnish
Timing:

1st autumn
Learning outcomes:
Upon completion the student should 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.
Learning activities and teaching methods:
36 hours of lectures
Target group:
Biology, Geology, Mechanical Engineering, Process Engineering, compulsory.
Geography, optional.
Recommended or required reading:
Petrucci, R.H., Harwood, W.S., and Herring, F.G.: General Chemistry: Principles and Modern Applications, Prentice Hall, 8th edition (2002) or a newer edition.
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Lecturer Minna Tiainen
Other information:
This course is only for students who have chemistry as a minor subject.
This course has partly the same contents as the course Introduction to Chemistry (780113P) (and the course Introduction to Physical Chemistry). If a student performs also the course Introduction to Chemistry, this course will be cancelled in his/hers study register.

780372A: Basic Principles of Green Chemistry, 4 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Toivo Kuokkanen, Minna Tiainen

Opintokohteen kielet: Finnish

Leikkaavuudet:

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

ECTS Credits:
4 credits
Language of instruction:
Finnish
Timing:
Spring term
Learning outcomes:
Upon completion the student should have understanding of twelve principles of green chemistry and the principles of hazardous waste management.
Contents:
Environmental friendly chemistry. The principles of green chemistry with examples of real life, classification, utilization, refining and disposal of environmentally hazardous wastes. Hazardous Waste Management of the University of Oulu.
Learning activities and teaching methods:
37 hours of lectures
Target group:
Chemistry, optional
Recommended optional programme components:
Introduction to Chemistry (780113P) or Introduction to Physical Chemistry (780101P) and Introduction to Inorganic Chemistry (780102P) or Basic Principles in Chemistry (780109P).

Recommended or required reading:
Lancaster M.: Green Chemistry: An introductory text, RSC, 2002. Material given in the lecture (hazardous wastes).
Assessment methods and criteria:
Final exam
Grading:
1-5/fail
Person responsible:
Lecturer Minna Tiainen and Doc. Toivo Kuokkanen

782625S: Basic Principles of Quantum Chemistry, 3 - 4 op

Voimassaolo: - 31.07.2010

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Laasonen Kari

Opintokohteen oppimateriaali:
Cramer, Christopher J., , 2002
Opintokohteen kielet: Finnish

ECTS Credits:
3 credits
Language of instruction:
Finnish/English on demand.
Timing:
4th autumn/spring. The course is lectured every other year.
Learning outcomes:
After completing this course the students should have good knowledge of basics of quantum chemical modelling.
Contents:
This course focuses on the quantum chemical modelling. The emphasis is on the many-electron methods like Hartree-Fock, configuration method and density functional theory. The computational aspects like the basis set are discussed in detail. Application to IR and Raman spectra are considered in detail. This course focuses on the theoretical aspects whereas the hands-on exercises are dealt in the course 781626S Molecular modelling workshop.
Learning activities and teaching methods:
30 hours of lectures, one final examination.
Target group:
Chemistry, optional.
Recommended optional programme components:
Physical Chemistry II (782631S).
Recommended or required reading:
Material given in the lectures (in Finnish) and Cramer, C.J.: Essentials of Computational Chemistry, Willey, 2002.
Person responsible:
Prof. K. Laasonen

784637S: Biological NMR Spectroscopy, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Mattila, Sampo Antero

Opintokohteen kielet: English

ECTS Credits:
3 credits

Language of instruction:
English
Timing:
The course is lectured every year.
Learning outcomes:
After the course the students have basic knowledge and hands on experience with backbone assignment of small ^{15}N/ ^{13}C labelled proteiin using most common 3 dimensional triple resonance NMR spectra.
Contents:
During the course the students get hands on experience on setting up and acquiring multi dimensional spectra as well as processing and converting data to other formats and assigning protein backbones.
Learning activities and teaching methods:
14 hours of lectures + applications, 30 hours of exercises
Target group:
Chemistry, optional
Recommended or required reading:
Zerbe (ed): Bio-NMR in Drug Research, Wiley-VCH and Cavanagh: Protein NMR Spectroscopy, Academic Press, 1995 (partly) ISBN: 0121644901.
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Senior assistant Sampo Mattila

782621S: Catalysis, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Pursiainen Jouni

Opintokohteen kielet: Finnish

ECTS Credits:
3 credits
Language of instruction:
Finnish/English on demand.
Timing:
4th or 5th spring. The course is lectured every other year, next time during the spring 2012.
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.
Learning activities and teaching methods:
30 hours of lectures
Target group:
Chemistry, optional
Recommended optional programme components:
Physical Chemistry II (782631S)
Recommended or required reading:
Gates, B.C.: Catalytic Chemistry, John Wiley & Sons, 1992, partly. Examination based on the lectures.
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Prof. Jouni Pursiainen

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

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Toivo Kuokkanen

Opintokohteen kielet: Finnish

ECTS Credits:
4 credits
Language of instruction:
Finnish
Timing:
4th or 5th spring. The course is lectured every other year, next time during the spring 2013.
Learning outcomes:
After completing this course, the student should have acquired knowledge and understanding of theory and practice with chemical applications in utilization and disposal of chemical wastes, especially hazardous wastes as well as with new chemical environmental technology
Contents:
Principles and activities in management of hazardous and other chemical wastes, modern treating methods of chemical wastes, new chemical methods and technologies in the utilization of chemical wastes, especially hazardous wastes
Learning activities and teaching methods:
30 hours of lectures + seminar + home work
Target group:
Chemistry, optional
Recommended optional programme components:
Basic Principles in Green Chemistry (780372A)
Recommended or required reading:
Clark, J.H.: Chemistry of Waste Minimization, Blackie Academic & Professional, Glasgow 1995, partly and material handed out by the lecturer.
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Doc. Toivo Kuokkanen

780321A: Chemical Legislation in Fnland, 1 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Pentti Oksman

Opintokohteen kielet: Finnish

Leikkaavuudet:

780681S Chemical Legislation in Finland 1.0 op

ECTS Credits:
1 credit
Language of instruction:
Finnish
Timing:
3 rd autumn

Learning outcomes:
After completion of the course students have a basic understanding of Finnish legislation concerning chemistry and occupational health. He/she is acquainted with the limitations of the use of dangerous chemicals and is able to find updated information of them. After completion of the course students should also have a basic understanding of the main laws of pressure containers and tanks of compressed gases as well as of radiation.
Contents:
Safety at work, sanitarily and environmentally hazardous chemicals, explosive materials and combustible liquids, pressure containers and tanks of compressed gases.
Learning activities and teaching methods:
10 hours of lectures
Target group:
Chemistry, compulsory.
Recommended or required reading:
Työpaikan lakikirja. Työpaikan kemikaalilainsäädäntö.
Assessment methods and criteria:
Final examination
Grading:
Pass/fail
Person responsible:
Senior Laboratory Manager, PhD. Pentti Oksman

780395A: Chemistry for Teachers, 4 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Leena Kaila

Opintokohteen kielet: Finnish

ECTS Credits:
4 credits
Language of instruction:
Finnish
Person responsible:
lecturer Leena Kaila

782634S: Chemistry in industrial applications, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Ulla Lassi

Opintokohteen kielet: Finnish

ECTS Credits:
3 credits
Language of instruction:
Finnish/English on demand.
Timing:
4th or 5th spring. The course is lectured every other yearnext time during the spring 2012.
Learning outcomes:
After this course the student is familiar with chemical applications in process and environmental technology. In particular, new applications of chemistry are considered.
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)
Learning activities and teaching methods:
30 hours of lectures
Target group:
Chemistry, optional
Recommended optional programme components:
Physical Chemistry I (780347A) and Physical Chemistry II (782631S)
Recommended or required reading:
Material given by the lecturer, scientific review papers.
Assessment methods and criteria:
Final examinations
Grading:
1-5/fail
Person responsible:
Prof. Ulla Lassi

781610S: Chemistry of Metal Complexes, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Leena Kaila

Opintokohteen kielet: Finnish

ECTS Credits:
3 credits
Language of instruction:
Finnish/English on demand.
Timing:
4th or 5th autumn. The course is lectured every other year.
Learning outcomes:
A profound understanding of concepts of coordination equilibrium, complex compounds in aqueous solutions and their solution equilibrium.
Contents:
Concepts of metal complexes in aqueous solutions, experimental methods, methods for construction and refinement of equilibrium models, applications.
Learning activities and teaching methods:
20 hours of lectures, one final examination.
Target group:
Chemistry, optional.
Recommended or required reading:
Material handed out by the lecturer.
Person responsible:
Lecturer L. Kaila

783627S: Chemistry of Natural Substances I, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Marja Lajunen

Opintokohteen kielet: Finnish

ECTS Credits:

3 credits
Language of instruction:
Finnish/English on demand.
Timing:
4th or 5th autumn or spring. The course is lectured every other year, next time during the autumn 2011.
Learning outcomes:
After this course the student can classify basic types of carbohydrates and lipids, explain their biosynthetic background and occurrence, analyze properties or evaluate and plan essential synthetics related to them.

Contents:
Natural products: Carbohydrates, their types, structures and reactivity, anomeric effect, mutarotation and consequences from these, protection, and glycosylation. Lipids: Fatty acids, eicosanoids, prostaglandins, phopholipids, their biosynthesis, chemistry and role in life science.
Learning activities and teaching methods:
20 hours of lectures
Target group:
Chemistry, optional
Recommended optional programme components:
Organic Chemistry I (780389A) and Organic Chemistry II (783643S)
Recommended or required reading:
Material handed out by the lecturer. Davis, B.G. and Fairbanks, A.J.: Carbohydrate Chemistry, Oxford Chemistry Primers, 2002, partly; Dewick, Paul M.: Medicinal Natural Products, A Biosynthetic Approach, Wiley & Sons Ltd, 1998.
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Prof. Marja Lajunen

783641S: Chemistry of Natural Substances II, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Marja Lajunen

Opintokohteen kielet: Finnish

ECTS Credits:
3 credits
Language of instruction:
Finnish/English on demand.
Timing:
4th or 5th spring. The course is lectured every other year, next time during spring 2012.
Learning outcomes:
After this course the student can classify types of terpenoids, steroids and alkaloids of natural substances, can explain their biosynthetic background and occurrence, analyze their properties and effects and evaluate their chemical reactivity.

Contents:
Natural products from secondary metabolism: Terpenoids, steroids and alkaloids
Learning activities and teaching methods:
20 hours of lectures
Target group:
Chemistry, optional
Recommended optional programme components:
Organic Chemistry I (780389A) and Organic Chemistry II (783643S)
Recommended or required reading:

Material handed out by the lecturer and Mann, J., Davidson, R.S., Hobbs, J.B., Banthorpe, D.V. ja Harborne, J.B.: Natural Products, Their Chemistry and Biological Significance, Longman Scientific & Technical, 1995. Dewick, Paul M.: Medicinal Natural Products, A Biosynthetic Approach, Wiley & Sons Ltd, 1998.
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Prof. Marja Lajunen

781621S: Chemistry of Non-Metals, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Raija Oilunkaniemi

Opintokohteen kielet: Finnish

ECTS Credits:
3 credits
Language of instruction:
Finnish/English on demand.
Timing:
4th or 5th autumn. The course is lectured every other year, next time during the spring 2013.
Learning outcomes:
This course will give the student an overview of the development of chemistry of non-metals by examining the current literature of the field.
Contents:
New methods in the synthesis of non-metallic compounds, structural chemistry, and chemical properties of non-metallic compounds.
Learning activities and teaching methods:
18 hours of lectures + seminar
Target group:
Chemistry, optional
Recommended optional programme components:
Inorganic Chemistry I (780353A).
Recommended or required reading:
Material handed out by the lecturer
Assessment methods and criteria:
Final examination, attendance at the lectures
Grading:
1-5/fail
Person responsible:
Doc. Raija Oilunkaniemi

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

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Hormi Osmo

Opintokohteen kielet: Finnish

ECTS Credits:
3 credits
Language of instruction:

Finnish/English on demand.
Timing:
4th or 5th spring. The course is lectured every other year, next time during the spring 2013.
Learning outcomes:
After passing the course the student can explain the chemical composition of paints and coatings and can illustrate modern technologies used in the preparation of paint / coating formulations.

Contents:
Most important polymers used as binders in paints / coatings, introduction to colour theory, new technologies used in the preparation of paints / coatings.
Learning activities and teaching methods:
24 hours of lectures
Target group:
Chemistry, optional
Recommended optional programme components:
Introduction to Polymer Chemistry (780326A)
Recommended or required reading:
Paul, S.: Surface Coatings Science and Technology, John Wiley & Sons, New York, 1986.
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Prof. Osmo Hormi

781613S: Chemistry of Rare Earth Elements, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Laitinen Risto

Opintokohteen kielet: Finnish

ECTS Credits:
3 credits
Language of instruction:
Finnish, English on demand.
Timing:
4th or 5th autumn. The course is lectured every other year, next time during the spring 2012.
Learning outcomes:
This course will familiarize students with the properties and applications of rare earths.
Contents:
Occurrence and separation properties of rare earths, chemical and physical characteristics (especially spectroscopic), coordination chemistry, and most importantant applications.
Learning activities and teaching methods:
18 hours of lectures
Target group:
Chemistry, optional
Recommended optional programme components:
Inorganic Chemistry I (780353A) and Inorganic Chemistry II (781642S)
Recommended or required reading:
Material handed out by the lecturer
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Prof. Risto Laitinen

781645S: Chemistry of Solid Fuels Ashes, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Minna Tiainen

Opintokohteen oppimateriaali:
Raiko, R., Saastamoinen, J., Hupa, M. & Kurki-Suonio, I., , 2002

Opintokohteen kielet: Finnish

ECTS Credits:
3 credits
Language of instruction:
Finnish/English on demand.
Timing:
4th or 5th autumn. The course is lectured every other year, next time during the spring 2013.
Learning outcomes:
Upon completion the student should have acquired an understanding of chemistry of combustion process, formation mechanisms of ashes and ash related problems.
Contents:
Solid fuels, ash forming material, combustion techniques, heterogeneous combustion, ash formation mechanisms, ash related problems in boiler, analytical methods (SEM-EDS).
Learning activities and teaching methods:
20 hours of lectures, problem based learning, portfolio, attendance is compulsory.
Target group:
Chemistry, optional.
Recommended optional programme components:
780353A Inorganic Chemistry I.
Recommended or required reading:
Raiko, R., Saastamoinen, J., Hupa, M. ja Kurki-Suonio, I., Poltto ja palaminen, Gummerus Oy, Jyväskylä (in Finnish).
Assessment methods and criteria:
Problem based learning, portfolio. Attendance is compulsory.
Grading:
1-5/fail
Person responsible:
Lecturer Minna Tiainen

781644S: Computational Inorganic Chemistry, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Laitinen Risto

Opintokohteen kielet: Finnish

ECTS Credits:
3 credits
Language of instruction:
Finnish/English on demand
Timing:
4th or 5th year. The course is lectured every other year, next time during the spring 2013.
Learning outcomes:
After this course the student is familiar with review of computational methods in quantum inorganic chemistry.
Contents:
Review of computational methods in quantum chemistry (molecular mechanics, semiempirical methods, ab initio methods, DFT methods), basis sets, computation of molecular properties, transition states, spectroscopic

properties. The application of the methods in inorganic chemistry will be illustrated by examples from current literature.
Learning activities and teaching methods:
28 hours of lectures, 14 hours of exercises
Target group:
Chemistry, optional
Recommended optional programme components:
Inorganic Chemistry I (780353A), Inorganic Chemistry II (781642S) and Quantum Mechanics and Spectroscopy (782630S).
Recommended or required reading:
Recommented reading: Young, D.: Computational Chemistry: A Pratical Quide for Applying Techniques to Real World Problems, Wiley-Interscience, 2001; Hinchliffe, A.: Molecular Modelling for Beginners, John Wiley & Sons Ltd, 2003.
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Doc. Heikki Tuononen (University of Jyväskylä) and Prof. Risto Laitinen

784626S: Computer Analysis of NMR Spectra, 2 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Mattila, Sampo Antero

Opintokohteen kielet: Finnish

ECTS Credits:
2 credits
Language of instruction:
Finnish/English on demand
Timing:
4th or 5th autumn. The course is lectured every other year.
Learning outcomes:
After this course the student is familiar with computer aided NMR spectral processing and production, and assisgnment tools.
Contents:
The basic theory for analysing NMR spectra; the structure, function and use of simulating and iterating analysis programs.
Learning activities and teaching methods:
8 hours of lectures + 28 hours of exercises
Target group:
Chemistry, optional
Recommended or required reading:
Günther, H.: NMR Spectroscopy, 2nd ed., Wiley, 1995, partly. Laatikainen, R. ja Niemitz, M.: Perch, An Integrated software for Analysis of NMR spectra on PC, University of Kuopio, 1994.
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Senior assistant Sampo Mattila

780396A: Demonstrations in Physics and Chemistry, 2 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Leena Kaila

Opintokohteen kielet: Finnish

Leikkaavuudet:

766309A Demonstrations in Physics and Chemistry 2.0 op

ECTS Credits:
2 credits
Language of instruction:
Finnish
Timing:
3rd year
Target group:
Obligatory in pedagogical studies.
Grading:
pass/fail
Person responsible:
Lecturer Leena Kaila

781632S: Determination of Trace Elements, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Paavo Perämäki

Opintokohteen kielet: Finnish

ECTS Credits:
3 credits
Language of instruction:
Finnish
Timing:
4th or 5th spring. The course is lectured every other year, next time during the spring 2013.
Learning outcomes:
At the end of the course, the students should have acquired an understanding of special tasks that must be taken into account when very low element concentrations are measured.
Contents:
Sampling and sample preparation in trace and ultra trace elemental analysis, systematic errors (losses and contamination), clean rooms, separation and preconcentration techniques, hyphenated techniques.
Learning activities and teaching methods:
24 hours of lectures
Target group:
Chemistry, optional
Recommended optional programme components:
Sampling and Sample Preparation (781640S)
Recommended or required reading:
Material handed out by the lecturer
Assessment methods and criteria:
Final examination or home assignment
Grading:
1-5/fail
Person responsible:
Prof. Paavo Perämäki

780373A: Environmental Chemistry, 3 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Minna Tiainen

Opintokohteen kielet: Finnish

Leikkaavuudet:

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

ECTS Credits:
3 credits
Language of instruction:
Finnish
Timing:
3rd autumn
Learning outcomes:
Upon completion the student should have acquired an understanding of chemistry of atmosphere, hydrosphere and terrestrial environment.
Contents:
Fundamentals of environmental chemistry; chemistry of the soil, natural and waste waters and atmosphere, circulation of chemical compounds in the nature, chemical releases, environmentally toxic and other noxious compounds, environmental analytics and basics of physical measurements.
Learning activities and teaching methods:
30 hours of lectures, essay

Target group:
Chemistry, compulsory
Recommended optional programme components:
Introduction to Chemistry (780113P) or Introduction to Physical Chemistry (780101P) and Introduction to Inorganic Chemistry (780102P) or Basic Principles in Chemistry (780109P).
Recommended or required reading:
van Loon, G.W. & Duffy, S.J.: Environmental Chemistry, A Global Perspective, Oxford, 2000.
Assessment methods and criteria:
Final examination. Grading: 70% final examination, 30% essay.
Grading:
1-5/fail
Person responsible:
Lecturer Minna Tiainen

781633S: Experimental Design, 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Paavo Perämäki

Opintokohteen kielet: Finnish

ECTS Credits:
4 credits
Language of instruction:
Finnish
Timing:
4th or 5th spring. The course is lectured every other year, next time during the spring 2012.

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.
Learning activities and teaching methods:
30 hours of lectures, exercises: computer aided analysis of experimental data
Target group:
Chemistry, optional
Recommended optional programme components:
Statistical Methods in Analytical Chemistry (781631S)
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
Grading:
1-5/fail
Person responsible:
Prof. Paavo Perämäki

781600S: Final Examination in Inorganic Chemistry, 7 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
7 credits
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.
Target group:
Chemistry, compulsory.
Recommended or required reading:
Inorganic Chemistry: Housecroft, C. E. and Sharpe, A. G. Inorganic Chemistry, 3. painos, Pearson Education, 2007.
Person responsible:
Professors.

783600S: Final Examination in Organic Chemistry, 7 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

7 credits
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.
Target group:
Chemistry, compulsory.
Recommended or required reading:
Organic Chemistry: Clayden, J., Greeves, N., Warren, S. and Wothers, P.: Organic Chemistry, Oxford University Press, 2001 and one book by separate agreement.
Person responsible:
Professors.

782600S: Final Examination in Physical Chemistry, 7 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen oppimateriaali:
Clayden, J., Greeves, N., Warren, S. ja Wothers, P., , 2001
Cotton, F. Albert , , 1995

Opintokohteen kielet: Finnish

ECTS Credits:
7 credits
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.
Target group:
Chemistry, compulsory.
Recommended or required reading:
Physical Chemistry: by separate agreement.
Person responsible:
Professors.

784600S: Final Examination in Structural Chemistry, 7 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
7 credits
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.
Target group:
Chemistry, compulsory.
Recommended or required reading:
Structural Chemistry: by separate agreement.
Person responsible:
Professors.

782618S: High Pressure Kinetics, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Toivo Kuokkanen

Opintokohteen kielet: Finnish

ECTS Credits:
3 credits
Language of instruction:
Finnish
Timing:
4th or 5th year. The course is lectured every other year, next time during the spring 2012.
Learning outcomes:
Upon completion of the course, the student should have acquired knowledge and understanding of different effects of pressure on various chemical reactions, especially on reaction rates.
Contents:
Chemical applications of high pressure, determination and calculation of activation volumes, activation volumes of different reaction classes, reaction kinetics by UV/Vis spectrometric methods, especially organic host-guest reactions
Learning activities and teaching methods:
20 hours of lectures + three home works
Target group:
Chemistry, optional
Recommended optional programme components:
Physical Chemistry I (780347A) and Physical Chemistry II (782631S) passed.
Recommended or required reading:
Material given in the lecture and partly: Porter, G.: Progress in Reaction Kinetics, Pergamon Press, Oxford,1970., van Eldik, R.: Inorganic High Pressure Chemistry, Elsevier, New York 1986 and Reichardt, C.: Solvents and Solvent Effects in Organic Chemistry, 3 th ed.,Wiley-VCH Verlag GmbH, Weinheim 2003
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Doc. Toivo Kuokkanen.

781638S: ICP-MS Workshop, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Paavo Perämäki

Opintokohteen kielet: Finnish

ECTS Credits:
3 credits
Language of instruction:
Finnish
Timing:
4th or 5th spring. The course is lectured every other year, next time during the spring 2012.
Learning outcomes:
Upon completion of the course, student should have acquired knowledge and understanding of modern ICP-MS techniques and various applications of these techniques.
Contents:
ICP as an ion source, instrumentation (e.g. mass analyzers) and their properties, matrix and other interference effects and their elimination, special sample introduction techniques.
Learning activities and teaching methods:
20 hours of lectures and demonstrations + seminar presentation , and practical exercise
Target group:
Chemistry, optional
Recommended optional programme components:
Instrumental Analysis (780328A).
Recommended or required reading:
Material handed out by lecturer
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Prof. Paavo Perämäki

780341A: Industrial Training I, 2 op

Opiskelumuoto: Intermediate Studies

Laji: Practical training

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
2 credits
Timing:
2nd or 3rd year
Target group:
Chemistry, optional.

780342A: Industrial Training II, 4 op

Opiskelumuoto: Intermediate Studies

Laji: Practical training

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
4 credits
Timing:

2nd or 3rd year.
Target group:
Chemistry, optional.

780343A: Industrial Training III, 6 op

Opiskelumuoto: Intermediate Studies
Laji: Practical training
Vastuuyksikkö: Department of Chemistry
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

ECTS Credits:
6 credits
Timing:
2nd or 3rd period.
Target group:
Chemistry, optional.

780344A: Industrial Training IV, 8 op

Opiskelumuoto: Intermediate Studies
Laji: Practical training
Vastuuyksikkö: Department of Chemistry
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

ECTS Credits:
8 credits
Timing:
2nd or 3rd year.
Target group:
Chemistry, optional.

780353A: Inorganic Chemistry I, 6 op

Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Department of Chemistry
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish
Leikkaavuudet:

780356A Inorganic Chemistry 9.0 op

Voidaan suorittaa useasti: Kyllä

ECTS Credits:
6 credits
Language of instruction:
Finnish
Timing:
2 nd spring
Learning outcomes:
After this course the student is familiar with most important basic principles of modern inorganic chemistry.
Contents:

Atomic structure, chemical bond and molecular structure, solid state chemistry, acid-base theories, oxidation-reduction reactions, overview of main group chemistry.
Learning activities and teaching methods:
40 hours of lectures + 16 hours of exercises, 8 home assignments
Target group:
Chemistry, compulsory
Recommended optional programme components:
Introduction to Chemistry (780113P) or Introduction to Physical Chemistry (780101P) and Introduction to Inorganic Chemistry(780102P) or Basic Principles in Chemistry (780109P).
Recommended or required reading:
Atkins, P., Overton, T., Rourke, J., Weller, M., and Amstrong, F., Inorganic Chemistry, 5th ed., Oxford University Press, 2009.
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Doc. Raija Oilunkaniemi

781642S: Inorganic Chemistry II, 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

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

ECTS Credits:
4 credits
Language of instruction:
Finnish/English on demand
Timing:
4th autumn. The course is lectured every year.
Learning outcomes:
After this course the student is familiar with basic concepts of coordination chemistry of transition metal complexes.
Contents:
Structure and bonding of complexes of transition metals and their chemical and spectroscopic properties, organometallic chemistry, catalysis.
Learning activities and teaching methods:
22 hours of lectures + 16 hours of exercises, 8 home assignments
Target group:
Chemistry, compulsory
Recommended optional programme components:
Inorganic Chemistry I (780353A)
Recommended or required reading:
Atkins, P., Overton, T., Rourke, J., Weller, M., and Amstrong, F., Inorganic Chemistry, 5th ed., Oxford University Press, 2009.
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Doc. Raija Oilunkaniemi

780328A: Instrumental Analysis, 4 - 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Paavo Perämäki

Opintokohteen kielet: Finnish

Leikkaavuudet:

780324A Analytical Chemistry II 4.0 op

ECTS Credits:
5 credits
Language of instruction:
Finnish
Timing:
3 rd autumn
Learning outcomes:
After completing this course, the student should be able to understand the principles of most common instrumental methods of analysis that are used, for example, in industry and research.
Contents:
Atomic absorption and emission spectrometry, X-ray fluorescence spectrometry, molecular fluorescence, phosphorescence and chemiluminescence, NMR spectrometry, Mass spectrometry, Electroanalytical methods, Thermal analysis.
Learning activities and teaching methods:
40 hours of lectures + 6 hours of exercises
Target group:
Chemistry, compulsory
Recommended optional programme components:
Introduction to Analytical Chemistry (780111P)
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.
Grading:
1-5/fail
Person responsible:
Prof. Paavo Perämäki

782629S: Interactions between Molecules, 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Pursiainen Jouni

Opintokohteen kielet: Finnish

ECTS Credits:
4 credits
Language of instruction:
Finnish or English on demand.
Timing:
4th or 5th spring. The course is lectured every other year.
Learning outcomes:
Upon successful completion students should have a basic understanding of the principles and applications of intermolecular interactions. Non-covalent intermolecular interactions have fundamental effects in practically all the applications of modern chemistry, including solvent interactions, surface chemistry, catalysis and supramolecular chemistry.

Contents:
Principles and applications of intermolecular interactions. Electrostatic, van der Waals and pi-pi bonding. Host-guest interactions. Solvent effects and Huges-Ingold rules. Applications to solvent interactions, surface chemistry, catalysis and supramolecular chemistry.
Learning activities and teaching methods:
40 hours of lectures
Target group:
Chemistry, optional
Recommended optional programme components:
Physical Chemistry I (780347A) and Physical Chemistry II (782631S)
Recommended or required reading:
Atkins, P.W.: Physical Chemistry, Oxford University Press, Oxford, 6th ed.(1998) or 7th ed. (2002), Chapters 21-22. Reichart, C.: Solvents and Solvent Effects in Organic Chemistry, 2nd ed., VCH, 1990, partly.
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Prof. Jouni Pursiainen

780111P: Introduction to Analytical Chemistry, 4 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Paavo Perämäki

Opintokohteen kielet: Finnish

Leikkaavuudet:

780110P Analytical Chemistry I 5.5 op

ECTS Credits:
4 credits
Language of instruction:
Finnish
Timing:
1 st Spring
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.
Learning activities and teaching methods:
30 hours of lectures plus 10 hours of exercises
Target group:
Biochemistry, Chemistry, compulsory.
Mathematical Sciences, Physical Sciences, optional.
Recommended optional programme components:
Introduction to Chemistry (780113P) or 780101P Introduction to Physical Chemistry and 780102P Introduction to Inorganic Chemistry or Basic Principles in Chemistry (780109P).
Recommended or required reading:
Saarinen, H. ja Lajunen, L.H.J.: Analyyttisen kemian perusteet, Oulun yliopistopaino, 2004.
Assessment methods and criteria:
Two intermediate examinations or one final examination
Grading:
1-5/fail
Person responsible:
Prof. Paavo Perämäki

780113P: Introduction to Chemistry, 12 op

Voimassaolo: 01.08.2009 -
Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Department of Chemistry
Arvostelu: 1 - 5, pass, fail
Opettajat: Leena Kaila
Opintokohteen kielet: Finnish
Leikkaavuudet:

ay780118P	General and Inorganic Chemistry B (OPEN UNI)	5.0 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:
12 credits
Language of instruction:
Finnish
Timing:
1 st autumn
Learning outcomes:
After this course the student should understand basic concepts of chemistry as described in international general chemistry curriculum.
Contents:
Basic concepts of chemistry, chemical formula, chemical reaction, chemical equation, oxidation-reduction reactions, stoichiometry, gases, thermodynamics, electrons in atoms, periodic table, chemical bond, phase equilibrium, reaction kinetics, chemical equilibrium, acid-base equilibrium, equilibrium in water solutions of slightly soluble salts.

Learning activities and teaching methods:
70 hours of lectures and applications plus 50 hours of exercises

Target group:
Biochemistry, Chemistry, compulsory.
Physical sciences, Mathematical sciences, optional.
Recommended optional programme components:
Upper secondary school chemistry.

Recommended or required reading:
Petrucci, R.H., Herring, F.G., Madura, J.D. ja Bissonnette, C.: General Chemistry: Principles and Modern Applications, 10. painos (myös 7., 8. ja 9. painos), Pearson Canada Inc., Toronto, 2011.
Assessment methods and criteria:
Three intermediate examinations or one final examination
Grading:
1-5/fail
Person responsible:
Lecturer Leena Kaila

783638S: Introduction to Fiber Chemistry of Polysaccharides, 3 op

Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Department of Chemistry
Arvostelu: 1 - 5, pass, fail
Opettajat: Hormi Osmo
Opintokohteen kielet: Finnish

ECTS Credits:
3 credits
Language of instruction:
Finnish/English on demand.
Timing:
4th or 5th spring. The course is lectured every other year, next time during the autumn 2011.
Learning outcomes:
After passing the course the student can classify the most important chemicals used in papermaking.

Contents:
The fibre and its behaviour during papermaking, dry strength, wet strength, colloidal stability, retention and dewatering, water penetration and sizing, fillers and pigments, dyes, foam control, slime control.
Learning activities and teaching methods:
24 hours of lectures
Target group:
Chemistry, optional
Recommended optional programme components:
Introduction to Polymer Chemistry (780326A)
Recommended or required reading:
Eklund, D. ja Lindström, T.: Paper Chemistry, An Introduction, DT Paper Science Publication, Grankulla, 1991.
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Prof. Osmo Hormi

780102P: Introduction to Inorganic Chemistry, 5 op

Voimassaolo: - 03.06.2013

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Leena Kaila

Opintokohteen oppimateriaali:
Petrucci, R.H., Harwood, W.S., Herring, F.G. and Madura, J.D., , 2007
Opintokohteen kielet: Finnish

Leikkaavuudet:

ay780117P	General and Inorganic Chemistry A (OPEN UNI)	5.0 op
ay780118P	General and Inorganic Chemistry B (OPEN UNI)	5.0 op
780113P	Introduction to Chemistry	12.0 op
780102P2	Inorganic Chemistry I	4.0 op
780107P	Basic Course in Inorganic and Physical Chemistry	7.5 op
780152P	Inorganic and Physical Chemistry I	7.5 op
780153P	General and Inorganic Chemistry	7.5 op
780154P	Basic Inorganic Chemistry	7.5 op

ECTS Credits:
5 credits
Person responsible:
Lecturer L. Kaila.
Other information:
The course is not lectured after the academic year 2008-2009. It can be completed by final examination until 2011. The course has been united with the course Introduction to Physical Chemistry to a new course Introduction to Chemistry 12 credits (780113P).

780103P: Introduction to Organic Chemistry, 6 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Marja Lajunen

Opintokohteen kielet: Finnish

Leikkaavuudet:

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

Voidaan suorittaa useasti: Kyllä

ECTS Credits:
6 credits
Language of instruction:
Finnish
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 to describe orgacic 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: Additions, eliminations, substitutions, including aromatic electrophic one, reactions of carbonyl group. Applications.
Learning activities and teaching methods:
52 hours of lectures and applications plus 6 hours of exercises
Target group:
Biochemistry, Chemistry, compulsory.
Physical Sciences, Mathematical Sciences, optional.
Recommended optional programme components:
Upper secondary school chemistry.
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:
Three intermediate examinations or one final examination
Grading:
1-5/fail
Person responsible:
Prof. Marja Lajunen and Dr. Juha P. Koskela

780112P: Introduction to Organic Chemistry, 4 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay780112P	Introduction to Organic Chemistry (OPEN UNI)	4.0 op

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

ECTS Credits:
4 credits
Language of instruction:
Finnish
Timing:
1 st autumn and 1 st spring
Learning outcomes:
Upon completion of the course, student should have acquired knowledge and understanding of fundamentals of organic chemistry: structures and properties of organic compounds, basic reactions and types of mechanisms.
Contents:
Basic reactions of organic compounds, basic principles of stereochemistry and reaction mechanisms: Additions, eliminations, substitutions, including aromatic electrophilic ones, reactions of carbonyl group. Applications.
Learning activities and teaching methods:
32 hours of lectures and applications
Target group:
Biology, Process Engineering, compulsory.
Physical Sciences, Geology, Geograhpy, Mathematical Sciences, optional.
Recommended optional programme components:
Upper secondary school chemistry.
Recommended or required reading:
Hart, H., Hart, D.J. and Craine, L.E.: Organic Chemistry: A Short Course, 10 th or a newer edition, Houghton Mifflin Boston, 1999; Hart, H., Hart, D.J. and Craine, L.E.: Study Guide & Solutions Book, Organic Chemistry: A Short Course, 10th or a newer edition, Houghton Mifflin Boston, 1999.
Assessment methods and criteria:
Two intermediate examinations or one final examination
Grading:
1-5/fail
Person responsible:
Senior Assistant. Dr. J. Koskela
Other information:
Students attend the lectures of 780103 P Introduction of Organic Chemistry.

780101P: Introduction to Physical Chemistry, 7 op

Voimassaolo: - 31.12.2010

Opiskelumuoto: Basic Studies

Laji: Course

Arvostelu: 1 - 5, pass, fail

Opintokohteen oppimateriaali:
Petrucci, Ralph H., , 2002
Petrucci, R.H., Harwood, W.S., Herring, F.G. and Madura, J.D., , 2007

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay780117P General and Inorganic Chemistry A (OPEN UNI) 5.0 op
ay780118P General and Inorganic Chemistry B (OPEN UNI) 5.0 op
780113P Introduction to Chemistry 12.0 op
780109P Basic Principles in Chemistry 4.0 op
780101P2 Physical Chemistry I 4.0 op
780107P Basic Course in Inorganic and Physical Chemistry 7.5 op
780152P Inorganic and Physical Chemistry I 7.5 op
780153P General and Inorganic Chemistry 7.5 op
780154P Basic Inorganic Chemistry 7.5 op

ECTS Credits:
7 credits
Person responsible:
Lecturer Leena Kaila
Other information:
The course is not lectured after the academic year 2008-2009. It can be completed by final examination until 2011. The course has been united with the course Introduction to Inorganic Chemistry to a new course Introduction to Chemistry 12 credits (780113P).

780326A: Introduction to Polymer Chemistry, 2 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Hormi Osmo

Opintokohteen kielet: Finnish

Leikkaavuudet:

783650S Introduction to Chemistry 2.0 op

ECTS Credits:
2 credits
Language of instruction:
Finnish
Timing:
1 st spring
Learning outcomes:
After passing the course the student can explain the basics in chemistry of polymeric materials with emphasis on commodity plastics.

Contents:
Different classifications of polymeric materials, most important terms in polymer chemistry, basics in the nomenclature of polymers, most important molecular weights of polymers, additives, glass transition temperature, the chemistry involved in the preparation of commodity plastics.

Learning activities and teaching methods:
20 hours of lectures
Target group:
Chemistry, compulsory.
Recommended optional programme components:
Introduction to Organic Chemistry (780103P or 780112P).
Recommended or required reading:
Stevens, M.P.: Polymer Chemistry, An Introduction, 3 rd ed, Oxford University Press, Oxford, 1999.
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Prof. Osmo Hormi

780122P: Introductory Laboratory Course in Chemistry, 3 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
3 credits
Language of instruction:
Finnish
Timing:
1st autumn or spring
Learning outcomes:
After this course the student can apply laboratory safety instructions and act accordingly to them. He/she can communicate by using basic laboratory terminology and can work in a group under quidance. The student identifies and can use basic laboratory tools. He/she can perform basic inorganic determinations : acid-base titrations, mass analysis or spectroscopic measurements and can apply them to analyze inorganic synthesis, study purity of products of organic synthesis by using thin layer chromatography and write a report related to the performance and analysis of the synthesis.

Contents:
Laboratory safety, bunsen burner, balances, volumetric measures, gravimetric determination, acid-base titration, pH, titration curves, acid-base indicators, buffer solutions, synthesis and analysis of Fe(II)oxalate, spectrophotometric determination, synthesis of acetyl salicylic acid, TLC.
Learning activities and teaching methods:
40 hours of laboratory work + demonstrations
Target group:
Biochemistry, Biology, Chemistry, Process Engineering, compulsory. Physical Sciences, Geology, Mathematical Sciences, optional.
Recommended optional programme components:
The course Basic Principles in Chemistry (780109P) passed or Biochemistry, Chemistry and teacher education students of Mathematics and Physics: simultaneous participation in the course Introduction to Chemistry (780113P).
Recommended or required reading:
Instruction Book (in Finnish): Kemian perustyöt
Assessment methods and criteria:
Final examination. Laboratory works and final examination has to be completed within next two terms.
Grading:
Pass/fail
Person responsible:
Prof. Marja Lajunen and teaching assistants.

780697S: Laboratory Course (Teachers), 20 op

Voimassaolo: - 31.07.2010
Opiskelumuoto: Advanced Studies
Laji: Course
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

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

Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Department of Chemistry
Arvostelu: 1 - 5, pass, fail
Opettajat: Leena Kaila
Opintokohteen kielet: Finnish

ECTS Credits:
7 credits
Language of instruction:

Finnish
Timing:
Part 1 (780330A-01): 1st spring
Part 2 (780330A-02): 2nd spring
Learning outcomes:
At the end of the course, the students should have acquired an understanding of basic qualitative inorganic chemistry, classical quantitative inorganic chemistry and basic inorganic synthetic chemistry.
Contents:
Part 1: Introduction to inorganic ion reactions and a qualitative analysis
Part 2: Water analysis, neutralization, synthesis and characterization of two complex compounds
Learning activities and teaching methods:
Part 1: 45 hours of laboratory work, 10 hours of work reports + final examination
Part 2: 80 hours of laboratory work, 45 hours of work reports + final examination
Target group:
Chemistry, compulsory.
Recommended optional programme components:
Part 1.: Introduction to Chemistry (780113p) or Introduction to Physical Chemistry (780101P9 and Introduction to Inorganic Chemistry (780102P). Introductory Laboratory Course in Chemistry (780122P).
Part 2.: Introduction to Chemistry (780113P) or Introduction to Physical Chemistry (780101P) and Introduction to Inorganic Chemistry (780102P), Introduction to Organic Chemistry (780103P or 780112P). Introductory Laboratory Course in Chemistry (780122P) and the first part of this laboratory course completed.
Recommended or required reading:
Material handed out in the laboratory.
Assessment methods and criteria:
Works, reports and the final exam passed.
Grading:
1-5/fail. 75 % laboratory work 25 % final examination.
Person responsible:
Lecturer Leena Kaila, Lecturer Minna Tiainen and teaching assistants
Other information:
Reports must be returned to the teaching assistants by the given deadline. Otherwise you have to do the work again.

Compulsory

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

Voimassaolo: 01.08.2005 -
Opiskelumuoto: Intermediate Studies
Laji: Partial credit
Vastuuyksikkö: Department of Chemistry
Arvostelu: 1 - 5, pass, fail
Opettajat: Minna Tiainen
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

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

Voimassaolo: 01.08.2005 -
Opiskelumuoto: Intermediate Studies
Laji: Partial credit
Vastuuyksikkö: Department of Chemistry
Arvostelu: 1 - 5, pass, fail
Opettajat: Leena Kaila
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

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

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
4 credits
Language of instruction:
Finnish
Timing:
2 nd autumn
Learning outcomes:
Upon completion of the course, students should have acquired understanding of basic techniques of organic chemistry such as distillation, extraction, crystallization, TLC, as well as safety issues, glassware and equipment, laboratory notebooks and written reporting of laboratory experiments. A student familiarizes with practical laboratory work by carrying out reactions in aromatic substitution with protective group strategy, organometallic chemistry, Aldol condensation, elimination and disproportionation.
Contents:
Review of methods in organic chemistry and TLC analysis. Producing of spectra, and GC analysis, Aldol condensation, Cannizzaro reaction, preparation of benzoic acid, preparation of cyclohexene, and preparation of 2-nitroresorcinol.
Learning activities and teaching methods:
22 h/week laboratory works
Target group:
Chemistry, compulsory.
Recommended optional programme components:
Introduction to Chemistry (780113P) or 780101P Introduction to Physical Chemistry and 780102P Introduction to Inorganic Chemistry or Basic Principles in Chemistry (780109P). Courses 780103P and 780122P passed. Simultaneous participation in the lecture course 780389A.
Recommended or required reading:
Clayden, J., Greeves, N., Warren, S. and Wothers, P.: Organic Chemistry, Oxford University Press, 2001. Laboratory Course Manual.
Assessment methods and criteria:
Works, reports and the final exam passed.
Grading:
1-5/fail
Laboratory works and reporting 2/3 and exam 1/3
Person responsible:
Senior Assistant Dr. Juha Koskela
Other information:
Reports must be returned to the teaching assistants by the given deadline. Otherwise you have to do the work again.

780332A: Laboratory Course I in Organic Chemistry, 4 op

Voimassaolo: - 31.07.2013

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
4 credits
Language of instruction:
Finnish

Timing:
2nd autumn
Learning outcomes:
Upon completion of the course, students should have acquired understanding of basic techniques of organic chemistry such as distillation, extraction, crystallization, TLC, as well as safety issues, glassware and equipment, laboratory notebooks and written reporting of laboratory experiments. Student familiarizes with practical laboratory work by carrying out reactions in aromatic substitution with protective group strategy, organometallic chemistry, Aldol condensation, elimination and disproportionation.
Contents:
Review of methods in organic chemistry and TLC analysis. Producing of spectra, and GC analysis, Aldol condensation, Cannizzaro reaction, preparation of benzoic acid, preparation of cyclohexene, and preparation of 2-nitroresorcinol.
Learning activities and teaching methods:
22 h/week laboratory works
Target group:
Biochemistry, compulsory
Recommended optional programme components:
Courses 780113P or 780101P and 780102P or 780109P, 780103P, and 780122P passed.
Recommended or required reading:
Clayden, J., Greeves, N., Warren, S. and Wothers, P.: Organic Chemistry, Oxford University Press, 2001. Laboratory Course Manual.
Assessment methods and criteria:
Works, reports and the final exam passed.
Grading:
1-5/fail
Person responsible:
Senior assistant Dr. Juha Koskela
Other information:
Reports must be returned to the teaching assistants by the given deadline. Otherwise you have to do the work again.

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

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Sanna Komulainen

Opintokohteen kielet: Finnish

ECTS Credits:
5 credits
Language of instruction:
Finnish
Timing:
2 nd autumn
Learning outcomes:
Upon completion of the course, the student should have acquired knowledge and understanding of basic experimental methods of physical chemistry which are learned in theory in the course 780347A 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 and rate of chemical reaction.

Learning activities and teaching methods:
2 hours of lectures of safety at work, one preliminary exam, 80 hours of laboratory experiments. Additionally, written laboratory reports, one per laboratory work.
Target group:
Chemistry, compulsory.

Recommended optional programme components:
Courses 780113P, 780122P and the preliminary test of the laboratory course passed. Simultaneous participation in the lecture course 780347A Physical Chemistry I.

Recommended or required reading:
Practical work handout; Atkins, P. W.: Physical Chemistry, 7 th ed., Oxford University Press, 2002, partly.
Assessment methods and criteria:
Laboratory works and reports passed.
Grading:
1-5/fail
Person responsible:
Doc. Toivo Kuokkanen and assistants
Other information:
Reports musta be returned to the teaching assistants by the given deadline. Otherwise you have to do the work again.

780382A: Laboratory Course in Physical Chemistry (TECH), 2 op

Voimassaolo: - 31.07.2010
Opiskelumuoto: Intermediate Studies
Laji: Course
Arvostelu: 1 - 5, pass, fail
Opettajat: Toivo Kuokkanen
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

781641S: Laboratory Course in Synthetic Inorganic Chemistry, 4 op

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

ECTS Credits:
4 credits
Language of instruction:
Finnish/English on demand.
Timing:
4th or 5th spring. The course is next time in the curriculum during the spring 2012. The course is performed as an intensive two-week period.
Learning outcomes:
After this course the student is familiar with most important advanced techniques in modern inorganic synthetic chemistry.

Contents:
One selected multistage synthesis. The intermediate and end products will be fully characterized.
Learning activities and teaching methods:
6 hours of lectures, 60 hours of laboratory work, written report
Target group:
Chemistry, optional
Recommended optional programme components:
Laboratory courses in Inorganic Chemistry, Physical Chemistry and Organic Chemistry, Structural Chemistry I (780317A).
Assessment methods and criteria:
Practical works and the report passed and final examination.
Grading:

1-5/fail
Person responsible:
Prof. Risto Laitinen and Doc. Raija Oilunkaniemi

783605S: Literature Survey in Organic Chemistry, 9 op

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

ECTS Credits:
9 credits
Language of instruction:
Finnish, English on demand.
Timing:
5th autumn, beginning.
Learning outcomes:
After finishing the Survey of Literature the student has got practice for the scientific reasoning and communication, information retrieval and its critical evaluation.
Contents:
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.
Target group:
Chemistry, compulsory.
Grading:
1 - 5.
Person responsible:
Professors, Docents, Dr level Senior Assistants and Lectures of the Chemistry Department.

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

Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Department of Chemistry
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

ECTS Credits:
2 credits
Language of instruction:
Finnish
Timing:
2 nd autumn and 3 rd autumn
Learning outcomes:
After this course the student can search and classify scientific information from various sources of chemical information. He/she can apply computer aided information retrieval, write a scientific report or poster. The student can apply principles of oral presentation for a talk, can apply ethical principles for research and reporting. The student can work in a group, present a poster or give a talk for an audience.

Contents:
Types of chemistry literature: Periodicals, patents, reference works, reviews and series, numerical data compilations and textbooks, Information retrieval (SciFinder, MDL CrossFire Commander), word processing and chemical drawing etc. and their use in the preparation of the thesis. Ethical principles related to research. Preparation of a treatise or seminar talk. Preparation or presentation of a poster.
Learning activities and teaching methods:
2 nd autumn 4 hours and 3 rd autumn 18 hours of lectures and exercises, poster

Target group:
Chemistry, compulsory
Assessment methods and criteria:
Preparation and presentation of a poster. Compulsory attendance at the lecture.
Grading:
pass/fail
Person responsible:
Prof. Marja Lajunen and Science and Technology Library Tellus

781627S: Main Group Chemistry, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Laitinen Risto

Opintokohteen kielet: Finnish

ECTS Credits:
5 credits
Language of instruction:
Finnish. English on demand.
Timing:
4th or 5th autumn. The course is lectured every other year, next time during the autumn 2011.
Learning outcomes:
After this course the student is familiar with recent progress in modern main group chemistry.
Contents:
Periodic system, hydrogen, alkali and alkaline earth metals, half- and non-metals.
Learning activities and teaching methods:
28 hours of lectures, 14 hours of exercises
Target group:
Chemistry, optional
Recommended optional programme components:
Inorganic Chemistry I (780353A)
Recommended or required reading:
Atkins, P., Overton, T., Rourke, J., Weller, M. ja Armstrong, F.: Inorganic Chemistry, 5th ed., Oxford University Press, Oxford 2009.
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Prof. Risto Laitinen

781601S: Master's Thesis in Inorganic Chemistry, 38 op

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
38 credits
Language of instruction:
Finnish, English on demand.
Timing:
5th autumn, beginning.

Learning outcomes:
After finishing the Thesis the student has got practice for the scientific reasoning and communication, information retrieval and its critical evaluation. The student can use research methods typical for his/her field and is familiar with the theoretical subject matter of his/her field.
Contents:
The Theses for the degree of M.Sc. consists of two parts: a research project (Master's Thesis) with a written report and survey of literature. The completion of the laboratory work and the research report is expected to take approximately four months of full-time work. Together, they are worth 38 ECTS credits. In addition, the student is required to write a survey of literature on a topic which will be decided together with the student's advisor. The survey can be, but does not necessarily have to be, on the same topic as the research project. The length of the survey should be about 40-60 pages with approximately 50 references. It is worth of 9 ECTS credits. The completion of the whole thesis (47 ECTS credits altogether) requires about six months of full-time work.
Target group:
Chemistry, compulsory.
Assessment methods and criteria:
A research project (Master's Thesis) with a written report and a survey of literature.
Grading:
1-5
Person responsible:
Professors, Docents, Dr level Senior Assistants and Lectures of the Chemistry Department.

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

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
20 credits
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.
Target group:
Teachers.
Assessment methods and criteria:
-
Grading:
1-5
Person responsible:
Professors, Docents, Dr level Senior Assistants and Lectures of the Chemistry Department

783601S: Master's Thesis in Organic Chemistry, 38 op

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
38 credits
Language of instruction:
Finnish, English on demand.
Timing:
5th autumn, beginning.
Learning outcomes:
After finishing the Thesis the student has got practice for the scientific reasoning and communication, information retrieval and its critical evaluation. The student can use research methods typical for his/her field and is familiar with the theoretical subject matter of his/her field.
Contents:
The Theses for the degree of M.Sc. consists of two parts: a research project (Master's Thesis) with a written report and survey of literature. The completion of the laboratory work and the research report is expected to take approximately four months of full-time work. Together, they are worth 38 ECTS credits. In addition, the student is required to write a survey of literature on a topic which will be decided together with the student's advisor. The survey can be, but does not necessarily have to be, on the same topic as the research project. The length of the survey should be about 40-60 pages with approximately 50 references. It is worth of 9 ECTS credits. The completion of the whole thesis (47 ECTS credits altogether) requires about six months of full-time work.
Target group:
Chemistry, compulsory.
Assessment methods and criteria:
A research project (Master's Thesis) with a written report and a survey of literature.
Grading:
1-5
Person responsible:
Professors, Docents, Dr level Senior Assistants and Lectures of the Chemistry Department.

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

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
20 credits
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.
Target group:
Teachers.
Assessment methods and criteria:
-
Grading:
1-5
Person responsible:
Professors, Docents, Dr level Senior Assistants and Lectures of the Chemistry Department.

782601S: Master's Thesis in Physical Chemistry, 38 op

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
38 credits
Language of instruction:
Finnish, English on demand.
Timing:
5th autumn, beginning.
Learning outcomes:
After finishing the Thesis the student has got practice for the scientific reasoning and communication, information retrieval and its critical evaluation. The student can use research methods typical for his/her field and is familiar with the theoretical subject matter of his/her field.
Contents:
The Theses for the degree of M.Sc. consists of two parts: a research project (Master's Thesis) with a written report and survey of literature. The completion of the laboratory work and the research report is expected to take approximately four months of full-time work. Together, they are worth 38 ECTS credits. In addition, the student is required to write a survey of literature on a topic which will be decided together with the student's advisor. The survey can be, but does not necessarily have to be, on the same topic as the research project. The length of the survey should be about 40-60 pages with approximately 50 references. It is worth of 9 ECTS credits. The completion of the whole thesis (47 ECTS credits altogether) requires about six months of full-time work
Target group:
Chemistry, compulsory.
Assessment methods and criteria:
A research project (Master's Thesis) with a written report and a survey of literature.
Grading:
1-5
Person responsible:
Professors, Docents, Dr level Senior Assistants and Lectures of the Chemistry Department.

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

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
20 credits
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.
Target group:
Teachers.
Assessment methods and criteria:
-
Grading:
1-5
Person responsible:
Professors, Docents, Dr level Senior Assistants and Lectures of the Chemistry Department.

784601S: Master's Thesis in Structural Chemistry, 38 op

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
38 credits
Language of instruction:
Finnish, English on demand.
Timing:
5th autumn, beginning.
Learning outcomes:
After finishing the Thesis the student has got practice for the scientific reasoning and communication, information retrieval and its critical evaluation. The student can use research methods typical for his/her field and is familiar with the theoretical subject matter of his/her field.
Contents:
The Theses for the degree of M.Sc. consists of two parts: a research project (Master's Thesis) with a written report and survey of literature. The completion of the laboratory work and the research report is expected to take approximately four months of full-time work. Together, they are worth 38 ECTS credits. In addition, the student is required to write a survey of literature on a topic which will be decided together with the student's advisor. The survey can be, but does not necessarily have to be, on the same topic as the research project. The length of the survey should be about 40-60 pages with approximately 50 references. It is worth of 9 ECTS credits. The completion of the whole thesis (47 ECTS credits altogether) requires about six months of full-time work.
Target group:
Chemistry, compulsory.
Assessment methods and criteria:
A research project (Master's Thesis) with a written report and a survey of literature.
Grading:
1-5
Person responsible:
Professors, Docents, Dr level Senior Assistants and Lectures of the Chemistry Department.

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

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
20 credits
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.
Target group:
Teachers.
Assessment methods and criteria:
-

Grading:
1-5
Person responsible:
Professors, Docents, Dr level Senior Assistants and Lectures of the Chemistry Department.

780699S: Maturity Test, 0 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

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

Contents:
Maturity test will be agreed with the responsible person of a survey of literature. Maturity test is a written essay type test, which shows students knowledge of the topic of the research area written with good language.
Target group:
Chemistry, compulsory
Grading:
pass/fail
Person responsible:
Professors, Docents, Doctor level Senior Assistants and Lectures of the Chemistry Department.

780381A: Maturity test, 0 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
0 credits
Language of instruction:
Finnish (Swedish or English)
Timing:
3 rd spring
Learning outcomes:
Upon completion the maturity test the student has shown thar he/she can descibe his/her research topic in a logical and crispy way using scientific terminology typical to chemistry.
Target group:
Chemistry, compulsory.
Person responsible:
Professors, Docents, Doctor level Senior Assistants and Lectures of the Chemistry Department.

782624S: Molecular Modelling, 3 - 4 op

Voimassaolo: - 31.07.2010

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Laasonen Kari

Opintokohteen oppimateriaali:

Leach, Andrew R. , , 1996
Leach, Andrew R. , , 2001

Opintokohteen kielet: Finnish

ECTS Credits:
3 credits
Language of instruction:
Finnish/English on demand.
Timing:
4th autumn/spring. The course is lectured every other year.
Learning outcomes:
After completing this course the students should have good knowledge of molecular modelling using empirical and ab initio molecular modelling methods.
Contents:
Principles of molecular dynamics and the statistical mechanics related to molecular modelling. Reasoning of the empirical force fields used in molecular mechanics. Ab initio molecular dynamics. Several examples of molecular dynamics studies. This course focuses on the theoretical aspects whereas the practical aspects will be dealt in the course 781626S Molecular modelling workshop.
Learning activities and teaching methods:
30 hours of lectures + 8 hours of exercises, one final examination.
Target group:
Chemistry, optional.
Recommended optional programme components:
Physical Chemistry II (782631S) and Basic Principles of Quantum Chemistry (782625S).
Recommended or required reading:
Material given by the lecturer (in Finnish) and Leach, A.R.: Molecular Modelling, Longman, 1996 or 2nd ed.
Person responsible:
Prof. K. Laasonen

781626S: Molecular Modelling Workshop, 3 - 4 op

Voimassaolo: - 31.07.2010

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Laasonen Kari

Opintokohteen kielet: Finnish

ECTS Credits:
3 credits
Language of instruction:
Finnish/English on demand.
Timing:
4th or 5th spring. The course is lectured every other year.
Learning outcomes:
Upon successful completion of this course students should have a understanding of the state-of-the-art molecular modelling programs like Gaussian or Gromacs and their use.
Contents:

Practical workshop where students learn to use some state-of-the-art molecular modelling program like Gaussian or Gromacs. If possible student's own problem is tried to solve using molecular modelling tools. A report of the work is done.
Learning activities and teaching methods:
8 hours of lectures, demonstration, practical exercise.
Target group:
Chemistry, optional.
Recommended optional programme components:
Physical Chemistry II (782631S), Molecular Modelling (782624S), Basic Principles of Quantum Chemistry (782625S).
Recommended or required reading:
Material handed out by the lecturer, Gaussian or Gromacs Manuals.
Assessment methods and criteria:
Report of practical exercise.
Person responsible:
Prof. K. Laasonen

781639S: Molecular Symmetry and Spectroscopy, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Raija Oilunkaniemi

Opintokohteen kielet: Finnish

Leikkaavuudet:

780327A Structural Chemistry II 5.5 op

ECTS Credits:
5 credits
Language of instruction:
Finnish/English on demand.
Timing:
4th spring. The course is lectured next time during the autumn 2012.
Learning outcomes:
After this course the student is familiar with molecular symmetry and application of molecular symmetry in vibration spectroscopy and electronic absorption spectroscopy.
Contents:
Molecular symmetry, group theory, vibrational spectroscopy, electronic absorption spectroscopy.
Learning activities and teaching methods:
34 h lectures, 3 home assignments
Target group:
Chemistry, optional
Recommended optional programme components:
Inorganic Chemistry I 780353A) and Inorganic Chemistry II (781642S)
Recommended or required reading:
Material handed out by lecturer
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Doc. Raija Oilunkaniemi

784617S: Multinuclear NMR Spectroscopy in Structure Elucidation, 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Mattila, Sampo Antero

Opintokohteen kielet: Finnish

ECTS Credits:
4 credits
Language of instruction:
Finnish/English on demand
Timing:
4th or 5th spring. The course is lectured every other year.
Learning outcomes:
After this course the student is familiar with the NMR characteristics and use of various magnetic isotopes.
Contents:
The correlation of structural factors to spin-spin coupling constants and relaxation times of the nuclei in 14N, 15N, 17O, 19F, 29Si, 31P, 77Se and 195Pt. A practical exercise and a report.
Learning activities and teaching methods:
20 hours of lectures + applications + demonstrations
Target group:
Chemistry, optional
Recommended or required reading:
Mason, J. (ed.): Multinuclear NMR, Plenum Press, New York, 1987
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Serior assistant Sampo Mattila

784610S: NMR Spectroscopy in Organic Chemistry, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Mattila, Sampo Antero

Opintokohteen kielet: Finnish

ECTS Credits:
3 credits
Language of instruction:
Finnish/English on demand.
Timing:
4th autumn. The course is lectured every other year.
Learning outcomes:
After this course the student is familiar with the principles, methods, techniques and practise of structure elucidation of organic compounds by NMR spectroscopy.
Contents:
Modern multidimensional NMR techniques. Spectral runs, analysis and report of an unknown compound.
Learning activities and teaching methods:
14 hours of lectures + applications, 60 hours of exercises
Target group:
Chemistry, optional
Recommended or required reading:
Breitmaier, E.: Structure Elucidation by NMR in Organic Chemistry, A Practical Guide, Wiley, 1993.
Assessment methods and criteria:
Final examinations
Grading:
1-5/fail

Person responsible:
Serior assistant Sampo Mattila

784636S: NMR Spectroscopy of Polymers, 4 op

Voimassaolo: - 31.07.2011
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Department of Chemistry
Arvostelu: 1 - 5, pass, fail
Opettajat: Väänänen, Taito Lauri Johannes
Opintokohteen kielet: Finnish

ECTS Credits:
4 credits
Language of instruction:
Finnish, English on demand.
Timing:
The course is lectured every other year.
Learning outcomes:
After this course the student is familiar with basic principles of NMR spectroscopy of polymers.
Contents:
Preparation of liquid and solid state sample, the effect of concentration and temperature. Chemical shift and nit's anitisotropy. Dipole-dipole interaction, relaxation time and crosspolarisation and their connection to microstructure of polymers. Identification and quantification. A practical exercise and a report.
Learning activities and teaching methods:
20 hours of lectures + demonstrations + practical exercise + one final examination.
Target group:
Chemistry, optional.
Recommended optional programme components:
NMR Spectroscopy of Organic Chemistry (784610S) and NMR workshop I (784623S).
Recommended or required reading:
Alan E. Tonelli: NMR spectroscopy and polymer microstructure: The conformational connection, VCH, New York (1989). Richard A. Komoroski (ed.): High Resolution NMR Spectroscopy of Synthetic Polymers in Bulk, Methods in Stereochemical Analysis vol. 7, VCH, Florida (1986). P. Diehl et al. (ed.): NMR Basic Principles and Progress 29, Springer-Verlag, Berin (1993). Colin A. Fyfe: Solid State NMR for Chemists, C.F.C. Press, Guelph (1983). S. Braun et al.: 150 and More Basic NMR experiments: A Practical Course - Second Expanded Edition, VCH, Weinheim (1998).
Person responsible:
Doc. Taito Väänänen.

784623S: NMR Workshop I, 4 op

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

ECTS Credits:
4 credits
Language of instruction:
Finnish/English on demand
Timing:
4th autumn or spring. The course is lectured every other year.
Learning outcomes:
After this course the student is familiar with the common 1D and 2D NMR methods and their principles.

Contents:
A1D, 2D NMR techniques. Optimization of NMR measurement parameters: Theory and practice. NMR data processing.
Learning activities and teaching methods:
20 hours of lectures + demonstrations, 80 hours of exercises
Target group:
Chemistry, optional
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:
final examination
Grading:
1-5/fail
Person responsible:
Senior assistant Sampo Mattila

784624S: NMR Workshop II, 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Mattila, Sampo Antero

Opintokohteen kielet: Finnish

ECTS Credits:
4 credits
Language of instruction:
Finnish/English on demand
Timing:
4th spring. The course is lectured every other year.
Learning outcomes:
After this course the student is familiar with the advanced 1D and 2D NMR methods and has detailed understanding of pulse sequences in NMR.
Contents:
Product Operator Formalism. Pulse sequences: Design and programming. Use and programming of automatized spectrometer workflows.
Learning activities and teaching methods:
20 hours of lectures + demonstrations, 80 hours of exercises
Target group:
Chemistry, optional
Recommended optional programme components:
NMR-workshop I (784623S)
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:
Final examination
Grading:
1-5/fail
Person responsible:
Senior Assistant Sampo Mattila

784638S: NMR Workshop III, 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Mattila, Sampo Antero

Opintokohteen kielet: Finnish

ECTS Credits:
4 credits
Language of instruction:
Finnish/English on demand
Timing:
4th spring. The course is lectured every other year.
Learning outcomes:
After this course the student is familiar with the techniques commonly used in elucidation of organic compounds and natural products.
Contents:
Sample preparation. Spetrometer setup. Use of automatized workflows of recording series of 1-3D NMR experiments. Spectral processing. Assignment of NMR data.
Learning activities and teaching methods:
20 hours of lectures + demonstrations, 80 hours of exercises
Target group:
Chemistry, optional
Recommended optional programme components:
NMR workshop I (784623S)
Recommended or required reading:
Derome, A. E., Modern NMR Techniques for Chemistry Research, Pergamon Press, partly
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Senior assistant Sampo Mattila

784639S: NMR Workshop IV, 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Mattila, Sampo Antero

Opintokohteen kielet: Finnish

ECTS Credits:
4 credits
Language of instruction:
Finnish/English on demand
Timing:
4th spring. The course is lectured every other year.
Learning outcomes:
After this course the student is familiar with the 2-4D techniques commonly used in biomacromolecular NMR analysis.
Contents:
Protein backbone and sidechain 3D experiments. Other multidimensional methods. Magnetization transfer functions. Resolution and S/N. Processing of multidimensional NMR data.
Learning activities and teaching methods:
20 hours of lectures + demonstrations, 80 hours of exercises
Target group:
Chemistry, optional
Recommended optional programme components:
NMR workshop I (784623S)
Recommended or required reading:

Levitt, M.: Spin Dynamics: Basics of Nuclear Magnetic Resonance, John Wiley & Sons, 2001, partly and Cavanagh: Protein NMR Spectroscopy, Academic Press, 1995, ISBN: 0121644901.
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Senior assistant Sampo Mattila

780389A: Organic Chemistry I, 6 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Hormi Osmo

Opintokohteen kielet: Finnish

Leikkaavuudet:

780385A Organic Chemistry I 9.0 op

ECTS Credits:
6 credits
Language of instruction:
Finnish
Timing:
2 nd autumn
Learning outcomes:
After passing the course the student can explain the basics in molecular orbitals in simple organic compounds such as ethane, basics in physical organic chemistry especially the Hammet plot, details in nucleophilic substitution, conformation and stereochemistry in organic compounds.

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

Learning activities and teaching methods:
50 hours of lectures
Target group:
Chemistry, compulsory
Recommended optional programme components:
Introduction to Organic Chemistry (780103P) and Introduction to Chemistry (780113P) or Introduction to Physical Chemistry (780101P).
Recommended or required reading:
Clayden, J., Greeves, N., Warren, S. and Wothers, P.: Organic Chemistry, Oxford University Press, 2001. Chapters 1-4, 7, 16-18, 34 ja 42 and pages 1090-1100.
Assessment methods and criteria:
Two intermediate examinations or one final examination
Grading:
1-5/fail
Person responsible:
Prof. Osmo Hormi

783643S: Organic Chemistry II, 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Marja Lajunen

Opintokohteen kielet: Finnish

Leikkaavuudet:

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

ECTS Credits:
4 credits
Language of instruction:
Finnish/English on demand.
Timing:
4th autumn. The course is lectured every year.
Learning outcomes:
After this course the student can profoundly explain and analyze mechanisms of polar additions and eliminations, as well as carbonyl compounds as nucleophilic reagents. The student can compare and judge properties and reactions of aromatic heterocyclics and apply these to a practical synthetic route design.

Contents:
Polar additions and eliminations, enolates and their alkylation, aldol reaction, aromatic heterocyclics, their reactivity and reactions.
Learning activities and teaching methods:
35 hours of lectures + 7 hours of exercises
Target group:
Chemistry, compulsory
Recommended optional programme components:
Organic Chemistry I (780389A)
Recommended or required reading:
Clayden, J., Greeves, N., Warren, S. ja Wothers, P.: Organic Chemistry, Oxford University Press, 2001. Chapters 19, 20, 21, 26, 27, 43.
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Prof. Marja Lajunen

783639S: Organic Chemistry III, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Hormi Osmo

Opintokohteen kielet: Finnish

ECTS Credits:
5 credits
Language of instruction:
Finnish/English on demand
Timing:
5th autumn. The course is lectured every year.
Learning outcomes:
After passing the course the student can complete the way of thinking used in modern synthetic organic chemistry. The student can also give a detailed presentation of the synthesis of a challenging goal molecule.

Contents:
Detailed examination of reactions used in the synthesis of complicated organic compounds such as Retigeranic Acid.
Learning activities and teaching methods:

26 hours of lectures + seminar
Target group:
Chemistry
Recommended optional programme components:
Organic Chemistry I (780389A) and Organic Chemistry II (783643S)
Recommended or required reading:
Corey, E.J. ja Chen, X-M.: The Logic of Chemical Synthesis, John Wiley & Sons, New York, 1989, p. 1 - 100.
Assessment methods and criteria:
Written report on the synthesis of a complex target molecule and an oral presentation of the synthesis.
Grading:
1-5/fail
Person responsible:
Prof. Osmo Hormi

783614S: Organic Chemistry of Drug Compounds, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Marja Lajunen

Opintokohteen kielet: Finnish

ECTS Credits:
3 credits
Language of instruction:
Finnish/English on demand.
Timing:
4th or 5th year
Learning outcomes:
After this course the student can describe essential features and steps of modern drug design and development. He/she can classify ways of actions and targets of drugs, can describe pharmacokinetic factors affecting to a drug, principles of QSAR and explain drug's action to DNA.

Contents:
Drug discovery and drug development, QSAR, combinatorial synthesis, computers in medicinal chemistry, drug action at enzymes and receptors, drugs interacting with DNA, drug metabolism, prodrugs and their activation.
Learning activities and teaching methods:
20 hours of lectures.
If the course is not lectured, one exam per year can be arranged by a separate agreement.
Target group:
Chemistry, optional
Recommended optional programme components:
Organic Chemistry I (780389A) and Organic Chemistry II (783643S)
Recommended or required reading:
Patrick, G.L.: An Introduction to Medicinal Chemistry, Oxford University Press, 2001, partly.
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Prof. Marja Lajunen

783640S: Organometallic Chemistry, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Marja Lajunen

Opintokohteen kielet: Finnish

ECTS Credits:
3 credits
Language of instruction:
Finnish/English on demand.
Timing:
4th autumn. The course is lectured every other year, next time during the autumn 2012.
Learning outcomes:
After this course the student can judge, compare and use basic organometallic compounds in synthetic design and exploit their properties in practice.

Contents:
Chemistry of Li, Mg, Cu, B, or Si in asymmetric reaction design and practical synthesis.
Learning activities and teaching methods:
24 hours of lectures
Target group:
Chemistry, optional
Recommended optional programme components:
Organic Chemistry II (783643S)
Recommended or required reading:
Clayden, J., Greeves, N., Warren, S., and Wothers, P., Organic Chemistry, Oxford University Press, 2001 (partly); Jenkins, P.: Organometalic Reagents in Synthesis, Oxford Science Publications, 1997, partly. Thomas, S.E.: Organic Synthesis, The Role of Boron and Silicon, Oxford Science Publications, 1997, partly.
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Prof. Marja Lajunen

780078Y: Orientation Course for New Students, 1 op

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Kopsa-Moilanen, Vieno Maria

Opintokohteen kielet: Finnish

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

Contents:
The course comprises of four modules: The programme of orientation week, The tours in the department of chemistry, Orientation in small groups,and PSP (Personal Study Plan).

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
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).
Grading:
pass/fail
Person responsible:
Professor Marja Lajunen, Lecturer L. Kaila, Amanuensis, and Small group tutors.
Other information:
The course is completed when all the four parts are passed.

783645S: Pericyclic chemistry, 3 op

Voimassaolo: 01.01.2008 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Marja Lajunen

Opintokohteen kielet: Finnish

ECTS Credits:
3 credits
Language of instruction:
Finnish
Timing:
4th or 5th spring, The course is lectured every other year, next time during spring 2013.
Learning outcomes:
After this course unit the student can classify and analyze the nature and types of pericyclic reactions. He/she can describe and explain the occurrence of separate pericyclic reactions, basics of click chemistry and use them to design pericyclic reactions.

Contents:
Pericyclic reaction types: cycloadditions, sigmatropic rearrangements, group transfer and electrocyclic reactions. The Woodward-Hoffman rules, thermal, photochemical, 1,3-dipolar cycloaddition and basics of click chemistry alike.
Learning activities and teaching methods:
20 hours of lectures
Target group:
Chemistry, optional
Recommended optional programme components:
780389A Orgaaninen kemia I and 783643S Organic Chemistry II
Recommended or required reading:
Fleming, I.: Pericyclic Reactions, Oxford University Press, 2002 and Clayden, J., Greeves, N., Warren, S. ja Wothers, P.: Organic Chemistry, Oxford University Press, 2001, partly.
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Prof. Marja Lajunen

780347A: Physical Chemistry I, 6 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Pursiainen Jouni

Opintokohteen kielet: Finnish

Leikkaavuudet:

780318A Physical Chemistry II 6.5 op

ECTS Credits:
6 credits
Language of instruction:
Finnish
Timing:
2 nd autumn
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.
Learning activities and teaching methods:
56 hours of lectures + applications + 14 hours of exercises
Target group:
Chemistry, compulsory.
Recommended optional programme components:
Introduction to Chemistry (780113P) or Introduction to Physical Chemistry (780101P) and Introduction to Inorganic Chemistry (780102P); or Basic Principles in Chemistry(780109P). Laboratory Course I in Physical Chemistry (780331A) has to be taken simultaneously with this course.
Recommended or required reading:
Atkins, P.W.: Physical Chemistry, Oxford University Press, Oxford, 6 Ed. (1998) or Atkins, P.W.: Physical Chemistry, 7 th ed., 2002.
Assessment methods and criteria:
Weekly examinations or one final examination
Grading:
1-5/fail
Person responsible:
Prof. Jouni Pursiainen

782631S: Physical Chemistry II, 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

780392A Physical Chemistry II 4.0 op

780349A Physical Chemistry II 4.0 op

ECTS Credits:
4 credits
Language of instruction:
Finnish. English on demand.
Timing:

4th autumn. The course is lectured every year. In the academic year 2011-2012 during the spring 2012.
Learning outcomes:
After completing this course the students should have good knowledge of the basics of quantum mechanics and statistical mechanics and their role in physical chemistry.
Contents:
Basic of quantum mechanics, particle-in-box, hydrogen atoms, LCAO model for molecules. Basics of statistical mechanics, partition function and how to derive statistical properties from it. Ideal and real gases. Diffusion and electrical conductivity.
Learning activities and teaching methods:
36 hours of lectures + 8 hours of assingment exercises
Target group:
Chemistry, compulsory
Recommended optional programme components:
Physical Chemistry I (780347A)
Recommended or required reading:
P.W. Atkins and J. de Paula, Atkins Physical Chemistry, 8th ed., 2006 (or 7th ed., 2002), Oxford University Press, Chapters 8-11, 16-17, 21.
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Prof. Risto Laitinen ja Prof. Jouni Pursiainen

783620S: Polymer Chemistry, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Hormi Osmo

Opintokohteen kielet: Finnish

ECTS Credits:
3 credits
Language of instruction:
Finnish/English on demand.
Timing:
4th autumn. The course is lectured every other year, next time during the spring 2012.
Learning outcomes:
After passing the course the student can explain the most important technical quantities of polymeric materials including the mathematical background of the quantities.
Contents:
Polymer molecular weights, conformation of polymers, the visco-elastic behaviour of polymers, the conduction of heat and electricity in polymers.
Learning activities and teaching methods:
28 hours of lectures
Target group:
Chemistry
Recommended optional programme components:
Introduction to polymer chemistry (780326A)
Recommended or required reading:
Elias, H-G: An Introduction to Plastics, VCH, Weinheim, 1993.
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Prof. Osmo Hormi

783636S: Polymer Chemistry in Materials Sciencies, 3 - 4 op

Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Department of Chemistry
Arvostelu: 1 - 5, pass, fail
Opettajat: Hormi Osmo
Opintokohteen kielet: Finnish

ECTS Credits:
3 credits
Language of instruction:
Finnish/English on demand.
Timing:
4th or 5th spring. The course is lectured every other year, next time during the spring 2013.
Learning outcomes:
After passing the course the student can explain technical characteristics such as strength, modulus and heat deflection temperature of the most important polymeric materials.

Contents:
Commodity plastics, engineering polymers, carbon fibre, aramid fibres, liquid crystalline polymers, heat stable polymers, epoxy resins.
Learning activities and teaching methods:
24 hours of lectures
Target group:
Chemistry, optional
Recommended optional programme components:
Introduction to Polymer Chemistry (780326A) (recommended).
Recommended or required reading:
Flinn, R.A. and Trojan, P.K., Engineering Materials and Their Applications, International Student Edition, Houghton Mifflin Comp., 4th ed., Boston 1990 (partly); Fawcett, A.H. (Editor): High Value Polymers, The Royal Society of Chemistry, Redwood Press Ltd., Melksham, 1991; Engineed Materials handbook, Part 1 and Part 2, ASM International, Metals Park, OH, 1993 (Part 1) and 1988 (Part 2).
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Prof. Osmo Hormi

781623S: Reaction Mechanisms in Inorganic Chemistry, 3 op

Voimassaolo: - 31.07.2012
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Department of Chemistry
Arvostelu: 1 - 5, pass, fail
Opettajat: Laitinen Risto
Opintokohteen kielet: Finnish

ECTS Credits:
3 credits
Language of instruction:
Finnish, English on demand.
Timing:
4th or 5th spring. The course is lectured every other year.
Learning outcomes:
After this course the student is familiar with present state of inorganic reaction mechanisms.

Contents:
Mechanistic implications of reaction kinetics, collision theory, transition state theory, study of reaction mechanisms, molecular structure and mechanisms, orbital symmetry, substitution reactions, electron transfer reactions, catalysis, photochemical reactions.
Learning activities and teaching methods:
24 hours of lectures + 2 home assignments
Target group:
Chemistry, optional
Recommended optional programme components:
Inorganic Chemistry I (780353A) and Inorganic Chemistry II (781642S)
Recommended or required reading:
Material handed out by the lecturer
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Prof. Risto Laitinen

780601S: Research Project, 12 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
12 credits
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.
Learning activities and teaching methods:
240 h laboratory works.
Target group:
Chemistry, compulsory.
Recommended optional programme components:
B.Sc. studies and Research Training (780301A).
Recommended or required reading:
Material given by teachers.
Person responsible:
Professors, Docents, Doctor level Senior Assistants and Lectures of the Chemistry Department.

783634S: Research Seminar in Organic Chemistry, 2 op

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
3 credits
Language of instruction:
Finnish and English
Timing:
Autumn + spring
Learning outcomes:
After taking part in weekly seminars the student can work in a group, present and report his/her scientific results in Finnish or English for a specialist audience.

Contents:
Design and following of projects in organic chemistry.
Target group:
Chemistry
Grading:
pass/fail
Person responsible:
Prof. Osmo Hormi and Prof. Marja Lajunen

787602J: Research Seminar in Organic and Polymer Chemistry, 3 op

Voimassaolo: - 31.07.2012

Opiskelumuoto: Post-graduate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
3 credits
Language of instruction:
English
Timing:
Autumn + spring
Learning outcomes:
During this study module the student presents comments and discusses constructively about his/her own or student colleagues' research project in Finnish or English. The student prepares and gives talks about his/her own projects ongoing in the field of organic, polymer or wood chemistry.

Contents:
Compulsory attendance and oral presentation of own projects during a period of one year.
Learning activities and teaching methods:
30 hours
Target group:
Chemistry
Recommended optional programme components:
All required advanced courses in organic chemistry and polymer chemistry
Grading:
pass/fail
Person responsible:
Prof. Osmo Hormi and Prof. Marja Lajunen

780301A: Research Training, 9 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Leena Kaila, Toivo Kuokkanen
Opintokohteen kielet: Finnish

ECTS Credits:
9 credits
Language of instruction:
Finnish, English on demand, materials in English (partly).
Timing:
3 rd autumn-spring.
Learning outcomes:
After completing this course, the student should be able to work independently in the laboratory and ability to write a scientific report and in Organic Chemistry after this course the student can perform a reaction sequence, is familiar with a chemical resolution and reduction, can solve qualitative multicomponent analysis by chemical separation and using IR, NMR, UV and MS analysis.
Contents:
Laboratory works in Inorganic Chemistry: Three laboratory projects on different fields of inorganic chemistry: ICP-OES-analysis, protonation constant, synthesis of an air sensitive compound
in Physical Chemistry: NIR-spectrophotometric study of hydrogen bonding, conductivity of an electrolytic solution, molecule modeling, adsorption, and surface tension
in Organic Chemistry: Preparation of UV- and IR samples, preparation of enamine, acylation of enamine, reduction of trans-cinnamaldehyde, chemical resolution of a-phenyl ethyl amine and qualitative analysis of three compounds.
Additionally, written laboratory reports, one per practical.
Learning activities and teaching methods:
240 hours of laboratory works (80 h/laboratory).
Target group:
Chemistry, compulsory.
Recommended optional programme components:
In Inorganic Chemistry: The compulsory courses of chemistry in the first and second year and in Physical Chemistry: Simultaneous participating in the course 782631S Physical Chemistry II and in Organic Chemistry: Courses 780389A and 780329A passed. Simultaneous participation in the lecture course 783643S.
Recommended or required reading:
In Inorganic Chemistry: Material handed out in the laboratory, in Physical Chemistry: Practical work handout. Atkins, P.W. Physical Chemistry, 7 th ed. 2002, Oxford University Press, partly and in Organic Chemistry: Clayden, J., Greeves, N., Warren, S. and Wothers, P.: Organic Chemistry, Oxford University Press, 2001., Department of Chemistry. Practical Organic Chemistry, 780332, 780389 and 780390. Laboratory Course Manual.
Assessment methods and criteria:
Laboratory works and reports.
Person responsible:
Lecturer L. Kaila, Doc. T. Kuokkanen, Senior Assistant Dr. J. Koskela.

Compulsory

780301A-01: Research Training, 3 op

Voimassaolo: 01.08.2006 -
Opiskelumuoto: Intermediate Studies
Laji: Partial credit
Vastuuyksikkö: Department of Chemistry
Arvostelu: 1 - 5, pass, fail
Opettajat: Leena Kaila
Opintokohteen kielet: Finnish

ECTS Credits:
3 credits

780301A-02: Research Training, 3 op

Voimassaolo: 01.08.2006 -
Opiskelumuoto: Intermediate Studies

Laji: Partial credit
Vastuuyksikkö: Department of Chemistry
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

ECTS Credits:
3 credits

780301A-03: Research Training, 3 op

Opiskelumuoto: Intermediate Studies
Laji: Partial credit
Vastuuyksikkö: Department of Chemistry
Arvostelu: 1 - 5, pass, fail
Opettajat: Juha Heiskanen
Opintokohteen kielet: Finnish

ECTS Credits:
3 credits
Person responsible:
Senior assistant Juha Koskela + assistants.

781640S: Sampling and Sample Preparation, 4 op

Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Department of Chemistry
Arvostelu: 1 - 5, pass, fail
Opettajat: Paavo Perämäki
Opintokohteen kielet: Finnish
Leikkaavuudet:

781335A Sampling and Sample Preparation 4.0 op

ECTS Credits:
4 credits
Language of instruction:
Finnish
Timing:
4th or 5th autumn. The course is lectured every other year, next time during the spring 2013.
Learning outcomes:
After this course student becomes aware of the importance of correct sampling. The student also gets knowledge how to i) sample and ii) prepare samples for various types of inorganic and organic analysis.
Contents:
Sampling errors and representative sampling, overview of sampling and sample preparation in the context of environmental analysis (both inorganic and organic analysis).
Learning activities and teaching methods:
24 hours of lectures + seminar presentation
Target group:
Chemistry, optional
Recommended optional programme components:
Introduction to Analytical Chemistry (780111P)
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
Grading:
1-5/fail
Person responsible:
Prof. Paavo Perämäki

781647S: Scanning electron microscopy, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Minna Tiainen

Opintokohteen kielet: Finnish

ECTS Credits:
3 credits
Language of instruction:
Finnish/English on demand.
Timing:
4th or 5th spring. The course is lectured every other year, next time during the spring 2012.
Learning outcomes:
Upon completion the student should have acquired knowledge and understanding of terminology of microscopy, function of SEM-EDS and applications of SEM-EDS.
Contents:
Basic terminology, Scanning electron microscope and EDS, image formation and processing, applications.
Learning activities and teaching methods:
20 hours of lectures
Target group:
Chemistry, optional.
Recommended optional programme components:
Inorganic Chemistry I (780353A)
Recommended or required reading:
Goodhew P.J.: Humphreys J. and Beanland R., Electron Microscopy and Analysis, 3rd ed., Taylor & Francis, 2000.
Assessment methods and criteria:
Problem based learning, portfolio, attendance is compulsory.
Grading:
1-5/fail
Person responsible:
Lecturer Minna Tiainen

780690S: Seminar, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
4 credits
Language of instruction:
Finnish, English on demand.
Timing:
5th spring.
Contents:

The student gives two presentations (20 min/each) on given scientific subjects related to the pro gradu (M.Sc.) thesis and distributes an abstract to the audience.
Target group:
Chemistry, compulsory.
Grading:
1-5/fail
Person responsible:
Lecturer Sampo Mattila, Lecturer Minna Tiainen

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

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
1 credits
Language of instruction:
Finnish
Timing:
3 rd 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.

Learning activities and teaching methods:
Students register for the course in the beginnig of autumn or spring term. Compulsory attendance.
Target group:
Chemistry, compulsory.
Recommended optional programme components:
Thesis for the degree of B.Sc. (780300A).
Grading:
1-5/fail
Person responsible:
Lecturer Sampo Mattila, Lecturer Minna Tiainen

782623S: Seminar in Physical Chemistry, 2 op

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:
4 credits
Language of instruction:
Finnish, English on demand.
Contents:
Designing and following projects in Physical Chemistry.
Person responsible:

Prof. J. Pursiainen

788602S: Seminar in Structural Chemistry, 2 op

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

ECTS Credits:
2 credits
Language of instruction:
Finnish, English on demand.
Timing:
Spring and autumn
Contents:
Student gives two presentations on a given scientific subject and distributes an abstract to the audience.
Learning activities and teaching methods:
20 hours of seminars
Target group:
Chemistry, optional
Grading:
1-5/fail
Person responsible:
Senior assistants Sampo Mattila

781611S: Solid State Chemistry, 4 op

Voimassaolo: - 31.07.2015
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Department of Chemistry
Arvostelu: 1 - 5, pass, fail
Opettajat: Laitinen Risto
Opintokohteen kielet: Finnish

ECTS Credits:
4 credits
Language of instruction:
Finnish
Timing:
4th or 5th spring. The course is lectured every other year, next time during the autumn 2012.
Learning outcomes:
Knowledge of synthesis, structures, spectroscopic properties, reactions, and applications of solid materials.
Contents:
Preparation of solid materials, structures of solids, crystal defects, thermodynamics and reaction kinetics, the effect of outer conditions on some reactions, phase diagrams and their applications, optical, magnetic and electric properties of solid materials, and industrial applications.
Learning activities and teaching methods:
28 hours of lectures
Target group:
Chemistry, optional
Recommended optional programme components:
Physical Chemistry I (780347A) and Inorganic Chemistry I (780353A)
Recommended or required reading:
West, A. R.: Basic Solid State Chemistry, 2nd Ed., John Wiley & Sons, Norwich, 1989

Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Prof. Risto Laitinen

781631S: Statistical Methods in Analytical Chemistry, 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Paavo Perämäki

Opintokohteen kielet: Finnish

ECTS Credits:
4 credits
Language of instruction:
Finnish
Timing:
4th or 5th autumn. The course is lectured every other year, next time during the autumn 2011.
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 methods.
Learning activities and teaching methods:
30 hours of lectures + 10 hours of exercises and practical exercise
Target group:
Chemistry, optional
Recommended optional programme components:
Introduction to Analytical Chemistry (780111P)
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.
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Prof. Paavo Perämäki

780317A: Structural Chemistry I, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Mattila, Sampo Antero

Opintokohteen kielet: Finnish

Leikkaavuudet:

784640S Structural Chemistry I 5.0 op

ECTS Credits:

5 credits
Language of instruction:
Finnish
Timing:
3 rd autumn
Learning outcomes:
After this course the student is familiar with the basics of interpretation of IR, NMR and mass spectra.
Contents:
Principles of chromatography, the interpretation of IR, NMR and mass spectra and methods of problem solving with the aid of IR, NMR and mass spectra.
Learning activities and teaching methods:
40 hours of lectures, 20 hours of demonstrations and exercises
Target group:
Chemistry, compulsory.
Recommended optional programme components:
Physical Chemistry I (780347A) and Introduction to Analytical Chemistry (780111P).
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
Grading:
1-5/fail
Person responsible:
Senior Assistant Sampo Mattila

781614S: Structural Methods in Inorganic Chemistry, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Raija Oilunkaniemi

Opintokohteen kielet: Finnish

ECTS Credits:
3 credits
Language of instruction:
Finnish, English on demand.
Timing:
4th or 5th year. The course is lectured every other year, next time during the autumn 2011.
Learning outcomes:
This course will give the student an overview of the application of multinuclear NMR spectroscopy as one of the instrumental methods for identification and structural characterization of inorganic compounds.
Contents:
Applications of NMR Spectroscopy in inorganic chemistry.
Learning activities and teaching methods:
20 hours of lectures + seminar
Target group:
Chemistry, optional
Recommended optional programme components:
Inorganic Chemistry I (780353A), Structural Chemistry I (780317A)
Recommended or required reading:
Material handed out by the lecturer.
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Prof. Risto Laitinen

782620S: Surface Chemistry I, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Ulla Lassi

Opintokohteen kielet: Finnish

ECTS Credits:
3 credits
Language of instruction:
Finnish/English on demand.
Timing:
4th or 5th autumn. The course is lectured every other year.
Learning outcomes:
After completing this course the students should have good knowledge of properties of liquid surfaces and interfaces. The role of surfactants is emphasised.
Contents:
This course focuses on properties of soft surfaces. A detailed view of liquid-gas, liquid-liquid interfaces are given. The roles of surfactant and liquid mixtures are studied in detail. A wide range of applications are discussed, for example emulsion, foams, flotation, nucleation, soaps on molecular level.
Learning activities and teaching methods:
30 hours of lectures, one final examination.
Target group:
Chemistry, optional.
Recommended optional programme components:
Physical Chemistry II (782631S).
Recommended or required reading:
Adamson, A.W.: Physical Chemistry of Surfaces, 6th ed., John Wiley & Sons, New York, 1997,
partly. Examination based on the lectures.
Person responsible:
Prof. K. Laasonen

782633S: Surface chemistry II, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Ulla Lassi

Opintokohteen kielet: Finnish

ECTS Credits:
3 credits
Language of instruction:
Finnish/English on demand.
Timing:
4th or 5th spring. The course is lectured every other yearnext time during the spring 2012.
Learning outcomes:
After the course the student is familiar with interfaces (solid-gas, solid-liquid), properties of surfaces and surface phenomena. Student knows the most important surface structures and methods used in surface science studies. Surface phenomena are significant in several industrial applications, and those applications are theoretically studied during the course.
Contents:
Properties of solid-gas and solid-liquid interfaces, Surface structures, Surface phenomena and Surface analytical methods. Heterogeneous catalysis at solid surfaces is studied as an application.
Learning activities and teaching methods:
30 hours of lectures

Target group:
Chemistry, optional
Recommended optional programme components:
Physical Chemistry I (780347A) and Physical Chemistry II (2631S)
Recommended or required reading:
Adamson, A.W. : Physical Chemistry of Surfaces, 6 th edition, John Wiley and Sons, New York, 1997 (to the appropriate extent); Somorjai, G.A. : Introduction to Surface Chemistry and Catalysis, John Wiley and Sons, New York, 1994 (to the appropriate extent). Lecture notes (in English).
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Prof. Ulla Lassi

781630S: Symposium in inorganic and analytical chemistry, 2 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Paavo Perämäki, Laitinen Risto

Opintokohteen kielet: Finnish

ECTS Credits:
2-3 credits
Language of instruction:
Finnish, English on demand.
Timing:
4th and 5th year. The course will be next time during the autumn 2011.
Learning outcomes:
Upon completion of the course, student should have acquired knowledge and understanding of recent development in inorganic chemistry and inorganic analytical chemistry. The student will be familiarized with the practices in international conferences.
Contents:
The attendance is compulsory. The student gives one presentation of 20 min on a topic taken from chemical literature.
Learning activities and teaching methods:
Instruction period, preparation of the presentation, a symposium of 1-2 days.
Target group:
Chemistry, optional
Assessment methods and criteria:
Compulsory attendance and one presentation on a topic taken from chemical literature.
Person responsible:
Prof. Risto Laitinen and Prof. Paavo Perämäki

783642S: Synthetic Methods in Green Chemistry, 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Marja Lajunen

Opintokohteen kielet: Finnish

ECTS Credits:
4 credits
Language of instruction:

Finnish/English on demand.
Timing:
4th or 5th autumn or spring. The course is lectured every other year.
Learning outcomes:
After this course the student can apply principles of green chemistry to a practical synthetic design. He/she can compare and infer methods, their conditions, atom economy and performance from green chemistry point of view. The student can modify and perform a microwave-assisted reaction and prepare ionic liquids.

Contents:
Alternative reaction media: water, supercritical fluids, and ionic liquids, their properties and use in synthetic applications. Introduction to microwave technique and microwave-assisted organic synthesis, two-phase systems, phase catalysis.

Learning activities and teaching methods:
20 hours of lectures, demonstration
Target group:
Chemistry, optional
Recommended optional programme components:
Organic Chemistry I (780389A) and Organic Chemistry II (783643S)
Recommended or required reading:
Material given by the lecturer
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Prof. Marja Lajunen

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

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
6 credits
Language of instruction:
Finnish, English on demand.
Timing:
3 rd 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.
Target group:
Chemistry, compulsory.
Recommended optional programme components:
The first and second year courses in chemistry.
Grading:
1-5/fail
Person responsible:
Professors, Docents, Doctor level Senior Assistants and Lectures of the Chemistry Department.

780079Y: Tutoring, 1 op

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Kopsa-Moilanen, Vieno Maria

Opintokohteen kielet: Finnish

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

Contents:
Meetings and discussions with the small group. Tours in the university campus.
Learning activities and teaching methods:
Meetings and discussions with the small group. Tours in the university campus.
Target group:
Chemistry. Optional
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.
Grading:
pass/fail
Person responsible:
Amanuensis and Student Services

783619S: Wood Chemistry, 3 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Hormi Osmo

Opintokohteen kielet: Finnish

ECTS Credits:
3 credits
Language of instruction:
Finnish
Timing:
4th or 5th autumn or spring. The course is lectured every other yearnext tine during the autumn 2012.
Learning outcomes:
After passing the course the student can explain the chemical composition of wood and the chemistry involved in chemical pulping of wood.
Contents:
The structure of wood, chemistry of carbohydrates, polysaccharides of wood, lignin, extractives, bark, pulping chemistry, bleaching.
Learning activities and teaching methods:
24 hours of lectures
Target group:
Chemistry, optional
Recommended optional programme components:
Introduction to Organic Chemistry (780103P)
Recommended or required reading:

Sjöström, E.: Wood Chemistry: Fundamentals and Applications, Academic Press, New York 1981.
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Prof. Osmo Hormi

781646S: X-Ray Chrystallography, 6 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Laitinen Risto

Opintokohteen kielet: Finnish

ECTS Credits:
6 credits
Language of instruction:
Finnish/English on demand.
Timing:
4th or 5th spring. The course is lectured every other year, next time during the autumn 2012.
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.
Learning activities and teaching methods:
36 hours of lectures + 8 hours of demonstrations + practical exercise with a written report
Target group:
Chemistry, optional
Recommended optional programme components:
Inorganic Chemistry I (780353A) and Molecular Symmetry and Spectroscopy (781639S)
Recommended or required reading:
Material handed out by the lecturer
Assessment methods and criteria:
Final examination
Grading:
1-5/fail
Person responsible:
Prof. Jussi Valkonen (University of Jyväskylä) and Prof. Risto Laitinen.