

Opasraportti

FTech - Courses in English for exchange students, Field of Chemistry (2017 - 2018)

Courses in English for exchange students in the Study Field of Chemistry at the Faculty of Technology

This Course Catalogue lists the chemistry courses taught in English that are available for exchange students during the Academic Year 2017-18 at the Faculty of Technology, University of Oulu.

NB! Course availability: The listed courses are available for **exchange students hosted by the Faculty of Technology / study field Chemistry and if they have the previous knowledge requirements** of the course.

Exchange students hosted by other study fields or other University of Oulu faculties usually cannot take these courses, especially if they do not have the required previous knowledge. They must contact the Liaison of the Faculty of Technology (contact information below) to ask if it is possible to participate.

When preparing your study plan for your application, use the information provided under the **Courses** tab in this catalogue. **Read carefully** the information of each course you wish to take (language of instruction, target group, contents, timing, preceding studies, additional information etc.).

Individual course codes include information on the **level of course**. There are 3 different levels of courses. The levels are marked with a **letter at the end of the course codes**, see explanations below. In WebOodi course descriptions the level is indicated in 'Type' section.

In academic year 2017-2018 there are **advanced (S) level courses available in English**. All **basic (P) and intermediate (A) level courses are only available in Finnish**, and therefore, not available for exchange students.

For information on the **exchange application process** please see www.oulu.fi/university/studentexchange. All exchange applicants must **submit their exchange application through the SoleMOVE application system** by the deadline given, and a proposed study plan (Learning Agreement signed by you and your home university) is attached to the on-line application.

Accepted exchange students are required to register to all courses and their exams. Course/exam registration takes place once you have received your University of Oulu login information close to the start of your exchange period. When registering you will be able to find detailed information on teaching and schedule here under **Instruction and Examinations** tabs.

Teaching schedules are **periodical**: Courses organised during **periods 1-2** are given on the **autumn** term (September-December), and respectively **periods 3-4** refer to courses given during the **spring** term (January-May).

Teaching periods for 2017-18

Autumn term 2017

Period 1: Sept 4 - Oct 27, 2017

Period 2: Oct 30 – Dec 22, 2017 (after period 2 there might be some exams until the end of January)

Spring term 2018

Period 3: Jan 8 – March 9, 2018

Period 4: March 12 – May 11, 2018 (after period 4 there might be some exams until the end of May)

For arrival and orientation dates see www.oulu.fi/university/studentexchange/academic-calender

Any questions about these courses should be addressed to:

Ms. Ph.D. Johanna Kärkkäinen
Exchange Coordinator for Chemistry
Research Unit of Sustainable Chemistry
Faculty of Technology, University of Oulu, Finland
Email. Johanna.Karkkainen(at)oulu.fi

Ms. M.Sc. Marita Puikkonen
Liaison for Faculty of Technology Student Exchange (Incoming & Outgoing Mobility) in
Process, Environmental and Mechanical Engineering, and Industrial Engineering and Management and Chemistry
Faculty of Technology, University of Oulu, Finland
Eddress: Study.Technology@oulu.fi

Further information on application process and services for incoming exchange students
www.oulu.fi/university/studentexchange or at International.Office@oulu.fi

Tutkintorakenteisiin kuulumattomat opintokokonaisuudet ja -jaksot

782641S: Catalysis, 5 op
782638S: Chemistry in Industrial Applications, 5 op
781657S: Experimental Design, 5 op
781627S: Main Group Chemistry, 5 op
781651S: Metrological Fundamentals of Analytical Chemistry, 5 op
783639S: Organic Chemistry III, 5 op
780601S: Project work, 12 op
781658S: Surface Analytical Techniques, 5 op
782637S: Surface Chemistry, 5 op
781655S: X-Ray Crystallography, 5 op

Opintojaksojen kuvaukset

Tutkintorakenteisiin kuulumattomien opintokokonaisuuksien ja -jaksojen kuvaukset

782641S: Catalysis, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

Finnish/English on demand

Timing:

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

Learning outcomes:

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

Contents:

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

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

40 hours of lectures, 94 hours of self-study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Physical Chemistry I (780347A)

Recommended optional programme components:

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

Recommended or required reading:

Examination is based on the lectures.

Assessment methods and criteria:

Final examination

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

Grading:

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

Person responsible:

Prof. Jouni Pursiainen

Working life cooperation:

No

Other information:

No

782638S: Chemistry in Industrial Applications, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

782338A Chemistry in Industrial Applications 5.0 op

ay782638S Chemistry in Industrial Applications (OPEN UNI) 5.0 op

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

Finnish/English on demand

Timing:

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

Learning outcomes:

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

Contents:

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

Mode of delivery:

Face-to-face teaching and seminars

Learning activities and teaching methods:

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

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Physical Chemistry I and Physical Chemistry II

Recommended optional programme components:

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

Recommended or required reading:

Material given by the lecturer, scientific review papers

Assessment methods and criteria:

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

Grading:

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

Person responsible:

Prof. Ulla Lassi

Working life cooperation:

No

Other information:

No

781657S: Experimental Design, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

Finnish. English on demand.

Timing:

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

Learning outcomes:

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

Contents:

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

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

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

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Metrological Fundamentals of Analytical Chemistry (781651S)

Recommended optional programme components:

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

Recommended or required reading:

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

Assessment methods and criteria:

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

Grading:

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

Person responsible:

Prof. Paavo Perämäki

Working life cooperation:

No

Other information:

No

781627S: Main Group Chemistry, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Laitinen Risto

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 134 hours of work

Language of instruction:

Finnish / English

Timing:

4th or 5th year. Next time in the fall semester 2017.

Learning outcomes:

Upon completing the course, the student is familiar with some current aspects of main group chemistry.

Contents:

Periodic table of the elements, hydrogen, alkali metals, alkaline earth metals, semi-metals and non-metals. The contents vary from year to year.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 28 hours, exercises 14 hours

Target group:

Chemist, chemistry teachers

Prerequisites and co-requisites:

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

Recommended optional programme components:

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

Recommended or required reading:

Overton, T., Rourke, J., Weller, M. ja Armstrong, F.: Inorganic Chemistry, 6. painos, Oxford University Press, Oxford 2014. Chapters 9-18. Lecture material.

Assessment methods and criteria:

The course will be assessed by a home examination.

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

Grading:

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

Person responsible:

Risto Laitinen

Working life cooperation:

No

Other information:

No

781651S: Metrological Fundamentals of Analytical Chemistry, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

Finnish

Timing:

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

Learning outcomes:

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

Contents:

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

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

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

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Introduction to Analytical Chemistry (780111P or 780119P)

Recommended optional programme components:

Previous 781631S Statistical Methods in Analytical Chemistry 4 credits

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

Recommended or required reading:

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

Assessment methods and criteria:

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

Grading:

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

Person responsible:

Prof. Paavo Perämäki

Working life cooperation:

No

Other information:

No

783639S: Organic Chemistry III, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opettajat: Juha Heiskanen, Johanna Kärkkäinen

Opintokohteen kielet: Finnish

ECTS Credits:

5 credits / 134 hours of work

Language of instruction:

Finnish/English on demand

Timing:

4th autumn – .

Learning outcomes:

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

Contents:

Fixed chapters from the textbook.

Mode of delivery:

Self-study

Learning activities and teaching methods:

134 hours of self study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Organic Chemistry I (780389A) and Organic Chemistry II (780393A/783643S).

Recommended optional programme components:

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

Recommended or required reading:

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

Assessment methods and criteria:

Contact the responsible teacher to arrange the final examination.

Grading:

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

Person responsible:

Juha Heiskanen and Johanna Kärkkäinen

Working life cooperation:

No

Other information:

No

780601S: Project work, 12 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

12 ECTS credits / 200 hours of work

Language of instruction:

Finnish, English on demand

Timing:

4th autumn-spring

Learning outcomes:

After the laboratory project the student knows a research work and methods of his/her field and has readiness to perform the Pro Gradu Thesis.

Contents:

Laboratory work and written report

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

200 hours of work including laboratory research and a report.

Target group:

Chemistry, compulsory

Prerequisites and co-requisites:

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

Recommended optional programme components:

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

Recommended or required reading:

Material given by teachers

Assessment methods and criteria:

Laboratory research and a report.

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

Grading:

The course utilizes verbal grading scale pass/fail.

Person responsible:

Matti Niemelä

Working life cooperation:

No

Other information:

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

781658S: Surface Analytical Techniques, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

Finnish/English on demand

Timing:

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

Learning outcomes:

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

Contents:

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

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

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

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Inorganic Chemistry I (780353A or 781301A)

Recommended optional programme components:

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

Recommended or required reading:

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

Assessment methods and criteria:

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

Grading:

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

Person responsible:

Lecturer Minna Tiainen

Working life cooperation:

No

Other information:

No

782637S: Surface Chemistry, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

5 credits /134 hours of work

Language of instruction:

Finnish/English on demand

Timing:

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

Learning outcomes:

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

Contents:

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

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

50 hours of lectures, 84 hours of self-study

Target group:

Chemistry, optional

Prerequisites and co-requisites:

Physical Chemistry I and Physical Chemistry II

Recommended optional programme components:

Previous courses Surface Chemistry I and Surface Chemistry II

Recommended or required reading:

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

Assessment methods and criteria:

Final Examination

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

Grading:

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

Person responsible:

Prof. Ulla Lassi

Working life cooperation:

No

Other information:

No

781655S: X-Ray Crystallography, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 134 hours of work

Language of instruction:

Finnish / English

Timing:

4th or 5th year. Next time in the fall semester 2017.

Learning outcomes:

Upon completing the course, the student is familiar with the basic principles of X-ray crystallography and is able to carry out a simple crystal structure determination.

Contents:

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

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

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

Target group:

Chemistry, chemistry teachers

Prerequisites and co-requisites:

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

Recommended optional programme components:

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

Recommended or required reading:

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

Lecture material.

Assessment methods and criteria:

The course will be assessed by a the report of the crystal structure determination.

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

Grading:

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

Person responsible:

Risto Laitinen

Working life cooperation:

No

Other information:

No