

# Opasraportti

## Open University - Engineering, manufacturing and construction (2020 - 2021)

### Tutkintorakenteisiin kuulumattomat opintokokonaisuudet ja -jaksot

485115S: Advanced topics on concrete technology, 5 op  
 466106S: Advanced topics on design of steel structures, 6 op  
 ay466106S: Advanced topics on design of steel structures (OPEN UNI), 6 op  
 462113S: Advanced topics on mechatronics and machine diagnostics, 5 - 10 op  
 ay462113S: Advanced topics on mechatronics and machine diagnostics (OPEN UNI), 5 op  
 771117P: Basic course in mineralogy, 5 op  
 771117P-01: Basic mineralogy, lectures, 0 op  
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 485202S: Building information modeling, 5 op  
 ay780397A: Chemistry for Teachers (OPEN UNI), 5 op  
 ay782338A: Chemistry in Industrial Applications (OPEN UNI), 5 op  
 477128S: Circular Bioeconomy, 5 op  
 ay477128S: Circular Bioeconomy (OPEN UNI), 5 op  
 477624S: Control System Methods, 5 op  
 466105S: Design of Steel Structures, 6 op  
 ay466105S: Design of Steel Structures (OPEN UNI), 6 op  
 ay488231S: Environmental Chemistry and Ecology (OPEN UNI), 5 op  
 ay781309A: Environmental Chemistry for Chemistry Teachers, 5 op  
 488143S: Environmental Impact Assessment, 5 op  
 485308S: Foundation Engineering, 5 op  
 485302A: Foundation Engineering, 5 op  
 ay485302A: Foundation Engineering (OPEN UNI), 5 op  
 485304S: Fundamentals of Civil Engineering, 5 op  
 780117P: General and Inorganic Chemistry A, 5 op  
 ay780117P: General and Inorganic Chemistry A (OPEN UNI), 5 op  
 780118P: General and Inorganic Chemistry B, 5 op  
 ay780118P: General and Inorganic Chemistry B (OPEN UNI), 5 op  
 485306S: Geoenvironmental Engineering, 5 op  
 477416S: High temperature processes, 5 op  
 ay477416S: High temperature processes (OPEN UNI), 5 op  
 451535P: History of Architecture I, lecture course, 4 op  
 ay451535P: History of Architecture I, lecture course (OPEN UNI), 4 op  
 451537A: History of Architecture II, lecture course, 3 op  
 ay451537A: History of Architecture II, lecture course (OPEN UNI), 3 op  
 451504A: History of Architecture III, 3 op  
 ay451504A: History of Architecture III (OPEN UNI), 3 op  
 451513S: History of Interior Design / Historical interiors, 5 op  
 488102A: Hydrological Processes, 5 op  
 ay488102A: Hydrological Processes (OPEN UNI), 5 op  
 450547A: Indesign Basics, 1 op  
 ay450547A: Indesign Basics (OPEN UNI), 1 op  
 ayA440190: Industrial Engineering and Management (IEM) Minor Subject Studies (OPEN UNI), 25 op

*Compulsory*

- ay555225P: Basics of industrial engineering and management (OPEN UNI), 5 op  
 ay555285A: Project management (OPEN UNI), 5 op  
 ay555286A: Process and quality management (OPEN UNI), 5 op  
 ay555264P: Managing well-being and quality of working life (OPEN UNI), 5 op  
 ay555242A: Product development (OPEN UNI), 5 op  
 771113P: Introduction to Geology I, 5 op  
 ay771113P: Introduction to Geology I (OPEN UNI), 5 op  
 771113P-02: Introduction to Geology I, Rock identification, 0 op  
 771113P-01: Introduction to Geology I, lectures, 0 op  
 771114P: Introduction to Geology II, 5 op  
 780116P: Introduction to Organic Chemistry, 5 op  
 ay780116P: Introduction to Organic Chemistry (OPEN UNI), 5 op  
 771116P: Introduction to Quaternary deposits of Finland and their resources, 5 op  
 771115P: Introduction to bedrock geology of Finland and ore geology, 5 op  
 491101P: Introduction to mining, 5 op  
 491102P: Introduction to solid earth geophysics, 5 op  
 ay477221A: Material and Energy Balances (OPEN UNI), 5 op  
 ay477231A: Material and Energy Balances I (OPEN UNI), 2 op  
 ay477232A: Material and Energy Balances II (OPEN UNI), 3 op  
 452561S: Modern Wood Architecture, 15 op  
 485109A: Numerical methods in structural engineering, 5 op  
 450541A: Photoshop, Advanced Photomanipulation, 2 op  
 ay450541A: Photoshop, Advanced Photomanipulation (OPEN UNI), 2 op  
 493300A: Principles of mineral processing, 5 op  
 ay493300A: Principles of mineral processing (OPEN UNI), 5 op  
 477524S: Process Optimization, 5 op  
 ay477524S: Process Optimization (OPEN UNI), 5 op  
 477501A: Process dynamics, 5 op  
 ay477501A: Process dynamics (OPEN UNI), 5 op  
 492300A: Rock mechanics, 5 op  
 461102A: Statics, 5 op  
 ay461102A: Statics (OPEN UNI), 5 op  
 455511P: Visual Arts I, 5 op  
 455512P: Visual Arts II, 3 op

## Opintojaksojen kuvaukset

### Tutkintorakenteisiin kuulumattomien opintokokonaisuuksien ja -jaksojen kuvaukset

#### **485115S: Advanced topics on concrete technology, 5 op**

**Voimassaolo:** 01.08.2020 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Civil Engineering field

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

- 466110S    Advanced topics on concrete technology    5.0 op  
 460156S-01    Advanced Course in Concrete Technology I, examination    0.0 op  
 460156S-02    Advanced Course in Concrete Technology I, laboratory exercises    0.0 op

460156S Advanced Topics Concrete Technology I 4.0 op

**ECTS Credits:**

5 ECTS credits / 132 hours of work

**Language of instruction:**

Finnish

**Timing:**

Autumn semester, periods 1-2

**Learning outcomes:**

After completing the course the student is able to manage the goal of the subject by broadening the knowledge to new concrete types and their design methods, testing and application conditions and also on concrete with special properties such as e.g. high-quality, high strength and self-compacting. He can also explain how to assess the structural condition of concrete

**Contents:**

Durability and defects of concrete structures, high-strength concrete, self-compacting concrete. Processing of secondary raw materials for the preparation of special concrete, utilization of fly ash, slag and dust

**Mode of delivery:**

Face-to-face and distance learning

**Learning activities and teaching methods:**

Lectures, excercises, case studies, laboratory sessions and self directed learning

**Target group:**

Students studying structural engineering

**Prerequisites and co-requisites:**

466109S Concrete technology

**Recommended optional programme components:**

The material that is in English will be distributed at the lectures 1) Lecture notes (mainly in Finnish) 2) BY 42, betonijulkisivun kuntotutkimus 2002, Suomen Betoniyhdistys. 3) BY 41, betonirakenteiden korjausohjeet, 2007, Suomen Betoniyhdistys. 4) IVO-B-13/91. 1991. Korkealujuusbetoni, uusi materiaali voimalaitosrakentamiseen, A. Ipatti. Imataran Voima Oy. 5) Itsetiivistyvä betoni, 2004, Suomen Betonitieto Oy.6) Suomen betoniyhdistys. Betoninormit 2004 : BY 50. Helsinki : Suomen betonitieto. 7) BY 51, betonirakenteiden käyttöikäsuunnittelu 2007. Suomen Betoniyhdistys

**Assessment methods and criteria:**

Passed laboratory excercises and exam

**Grading:**

Numerical grading scale 1-5. Grade 0 stands for a fail.

## 466106S: Advanced topics on design of steel structures, 6 op

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Mechanical Engineering

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Kangaspuoskari, Matti Johannes

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay466106S	Advanced topics on design of steel structures (OPEN UNI)	6.0 op
460128S-01	Advanced Course in Design of Steel Structures I, examination	0.0 op
460128S-02	Advanced Course in Design of Steel Structures I, exercise work	0.0 op
460128S	Advanced Topics on Design of Steel Structures I	4.0 op

**ECTS Credits:**

6 ECTS

**Language of instruction:**

Finnish

**Timing:**

Periods 3 and 4

**Learning outcomes:**

The student can explain the basics of fatigue design of a welded structure. The student is able to design sheet metal structures and welded plate beam structures. He / she is able to analyze and design steel structures and their joints. They are able to analyze dynamically loaded structures and to evaluate the effect of vibrations on the functionality and usability of structures.

**Contents:**

The following topics are covered during the course: Steel structure under fatigue load. Fracture toughness. Stability and bracing of a steel frame building. Fire design. Plated structural elements with stiffeners. Elements resistance to transverse forces. Cold-formed members. Mechanical vibrations. Seismic design. Chimneys. Crane supporting structures. Accidental design situations and progressive collapse.

**Mode of delivery:**

Face-to-face.

**Learning activities and teaching methods:**

Lectures and exercises 52 h. Self-study 110 h. Total 162 h = 6 ECTS Credits.

**Target group:**

Degree students who study steel structure design.

**Prerequisites and co-requisites:**

460117A Introduction to Structural Design and 466105S Design of Steel Structures. Key notes in courses Statics, Strength of Materials I, Strength of Materials II, Mechanics of materials and Mechanical Vibrations.

**Recommended or required reading:**

Lecture notes (in Finnish). Eurocodes 1990-1999.

**Assessment methods and criteria:**

Three midterm exams or one final exam is required. One design exercise is required.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Matti Kangaspuoskari

## **ay466106S: Advanced topics on design of steel structures (OPEN UNI), 6 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opettajat:** Kangaspuoskari, Matti Johannes

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

466106S    Advanced topics on design of steel structures    6.0 op

## **462113S: Advanced topics on mechatronics and machine diagnostics, 5 - 10 op**

**Voimassaolo:** 01.12.2016 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Mechanical Engineering

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay462113S    Advanced topics on mechatronics and machine diagnostics (OPEN UNI)    5.0 op

**Voidaan suorittaa useasti:** Kyllä

**Person responsible:**

Toni Liedes

**ay462113S: Advanced topics on mechatronics and machine diagnostics (OPEN UNI), 5 op**

**Voimassaolo:** 01.08.2019 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

462115S Tolerance Design 5.0 op

462113S Advanced topics on mechatronics and machine diagnostics 5.0 op

**771117P: Basic course in mineralogy, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu Mining School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Pekka Tuisku

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

5 ects

**Person responsible:**

Pekka Tuisku

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

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Basic Studies

**Laji:** Partial credit

**Vastuuyksikkö:** Oulu Mining School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Pekka Tuisku

**Opintokohteen kielet:** Finnish

**Voidaan suorittaa useasti:** Kyllä

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

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Basic Studies

**Laji:** Partial credit

**Vastuuyksikkö:** Oulu Mining School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Jukka-Pekka Ranta

**Opintokohteen kielet:** Finnish

**Voidaan suorittaa useasti:** Kyllä

## **485202S: Building information modeling, 5 op**

**Voimassaolo:** 01.08.2020 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Civil Engineering field

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

466114S Building information modeling 5.0 op

**ECTS Credits:**

5 ECTS credits / 132 hours of work

**Language of instruction:**

Finnish

**Timing:**

Autumn semester, periods 1-2

**Learning outcomes:**

After completing the course the student is able to make 3D models of buildings and detail the connections between building elements and components. He can model different building materials and is familiar with one commercial software.

**Contents:**

Modeling concrete and steel structures. Connections. Macros, Drawings.

**Mode of delivery:**

Face-to-face

**Learning activities and teaching methods:**

Lectures, exercises and self directed learning

**Target group:**

Students studying structural engineering

**Recommended or required reading:**

The material that is in English will be distributed at the lectures

**Assessment methods and criteria:**

Participation to lectures and exercises

**Grading:**

Pass or fail.

**Person responsible:**

Rauno Heikkilä

## **ay780397A: Chemistry for Teachers (OPEN UNI), 5 op**

**Voimassaolo:** 01.08.2019 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

780397A Chemistry for Teachers 5.0 op

**ECTS Credits:**

5 credits / 135 hours of work

**Language of instruction:**

Finnish

**Timing:**

2nd – 5th year, spring

**Learning outcomes:**

After this course the student should understand the importance of the experiments in the teaching of chemistry. Student should also be able to design demonstrations and laboratory experiments suitable in different levels of learning.

**Contents:**

The course familiarize the students with the experimental works in the schools. Basic concepts in chemistry are revised in the same time.

**Mode of delivery:**

Face-to-face teaching, compulsory.

**Learning activities and teaching methods:**

30 hours of laboratory work (compulsory), 105 hours self-study.

**Target group:**

Students in the teacher specialisation lines, optional

**Prerequisites and co-requisites:**

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**Recommended optional programme components:**

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

**Recommended or required reading:**

Material handed out by the the teacher.

**Assessment methods and criteria:**

Practical laboratory work and home work done and reported.

**Grading:**

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

**Person responsible:**

Teija Kangas

**Working life cooperation:**

No

## ay782338A: Chemistry in Industrial Applications (OPEN UNI), 5 op

**Voimassaolo:** 01.08.2019 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

782338A Chemistry in Industrial Applications 5.0 op

Ei opintojaksokuvauksia.

## 477128S: Circular Bioeconomy, 5 op

**Voimassaolo:** 01.08.2019 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Process and Environmental Engineering

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Elisa Koivuranta

**Opintokohteen kielet:** English

**Leikkaavuudet:**

ay477128S Circular Bioeconomy (OPEN UNI) 5.0 op

477125S	Recycling of bioproducts	5.0 op
477106S	Recycled Fiber Processes	3.0 op

**ECTS Credits:**

5 cr

**Language of instruction:**

English

**Timing:**

Implementation in the spring period 3.

**Learning outcomes:**

Upon completion of the course, a student should be able to recognize the incentives for the recycling of bioproducts and residues from forest industry. Student is familiarized with circular bioeconomy at the state-of-art level. Student is able to identify the challenges (properties, transportation ect.) of raw materials and their processing, can propose solutions and has ability to review the sustainability of final products.

**Contents:**

Reuse, recycling and utilization of bioproducts and side streams of forest industry in accordance with principles of circular bioeconomy. The properties and processing of raw material. Novel applications in circular bioeconomy.

**Mode of delivery:**

Lectures, group meetings and project work.

**Learning activities and teaching methods:**

Work load in the course is totally 133h. The number of lectures can vary but project working is main activities in the course.

**Target group:**

Students interested in circular bioeconomy.

**Prerequisites and co-requisites:**

488052A Introduction to Bioproduct and Bioprocess Engineering is recommended.

**Recommended or required reading:**

Lecture materials and other materials that will be announced at the lectures.

**Assessment methods and criteria:**

The assignment and seminar. More information about assessment methods is given during the course.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Elisa Koivuranta

**Working life cooperation:**

Visiting lecturers from the industry, when feasible.

**Other information:**

This Course replace course 477125S Recycling of bioproducts, 5 cr.

**ay477128S: Circular Bioeconomy (OPEN UNI), 5 op****Voimassaolo:** 01.08.2019 -**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** University of Oulu, Open University**Arvostelu:** 1 - 5, pass, fail**Opetus suunnattu:** University of Oulu, Open University**Opintokohteen kielet:** English**Leikkaavuudet:**

477128S	Circular Bioeconomy	5.0 op
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Ei opintojaksokuvauksia.

**477624S: Control System Methods, 5 op****Voimassaolo:** 01.08.2015 -**Opiskelumuoto:** Advanced Studies**Laji:** Course



**Vastuuyksikkö:** Field of Process and Environmental Engineering

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** István Selek

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

477614S Control System Methods 3.0 op

477605S Digital Control Theory 4.0 op

**ECTS Credits:**

5 ECTS / 135 hours of work

**Language of instruction:**

English

**Timing:**

Period 1 (autumn term)

**Learning outcomes:**

After completing the course, one understands the relevance and building blocks of model-based control design and system analysis. Relying on data-driven approaches, this course provides strong foundations for digital control design considering real-life applications.

**Contents:**

1. Control theory of linear time-invariant (LTI) systems in discrete-time (digital control). State-space representation and system analysis in time domain. Controllability, observability and related concepts. Relation of the static state feedback with PID control. Stability in Lyapunov sense. 2. Basics of LTI model identification using data. Model order reduction, model uncertainty. The relevance of LTI theory in the control of nonlinear systems. 3. Laboratory exercises with the Valmet DNA automation system.

**Mode of delivery:**

Regular lectures

**Learning activities and teaching methods:**

Lectures and exercises including guided computer simulations

**Target group:**

M.Sc. students in process and environmental engineering

**Prerequisites and co-requisites:**

The courses 477621A Control system analysis and 477622A Control system design are recommended beforehand.

**Recommended or required reading:**

Lecture handout;

Dorf, R. (2010) Modern Control Systems. Prentice-Hall, New York, 1104 s,

Ogata, K (2002) Modern Control Engineering. Prentice-Hall, New York, 964 s.,

Åström, K & Murray, R. (2009) Feedback Systems, An Introduction for Scientists and Engineers. Princeton University Press, New Jersey, 396 s.,

Landau, I. & Zito, G. (2005) Digital Control Systems, Springer. 485 pp.

Åström, K.J. & Wittenmark, B. (1984, 1997) Computer Controlled Systems: Theory and Design. Prentice-Hall International.

**Assessment methods and criteria:**

Completion of homeworks and final (written) exam.

**Grading:**

Numerical grading scale 1-5 or fail.

**Person responsible:**

István Selek

**Working life cooperation:**

No

## 466105S: Design of Steel Structures, 6 op

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Mechanical Engineering

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Kangaspuoskari, Matti Johannes

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

485118S	Design of Steel Structures	5.0 op
485108A	Desing of Steel Structures and Steel Construction	5.0 op
ay466105S	Design of Steel Structures (OPEN UNI)	6.0 op
460127S-01	Design of Steel Structures, examination	0.0 op
460127S-02	Design of Steel Structures, exercise work	0.0 op
460125A	Introduction to Design of Steel Structures	4.0 op
460125A-01	Introduction to Design of Steel Structures, examination	0.0 op
460125A-02	Introduction to Design of Steel Structures, exercise work	0.0 op
460127S	Design of Steel Structures	4.0 op

**ECTS Credits:**

6 ECTS

**Language of instruction:**

Finnish

**Timing:**

Periods 1 and 2

Course 485108A replaces this course in academic year 2021-2022.

**Learning outcomes:**

After completing the course the student is able to explain the basic nature of the crystalline structure of steel and its elastomeric material model. He / she is able to evaluate the effect of alloys, heat treatment and welding on the mechanical properties of steel. He / she can explain what happens to steel in the event of a fire and the basics of fire design. The student is able to design the joints of a steel structure frame and can dimension the steel structure under different load combinations. He / she is able to analyze stability problems and can explain inaccuracies and second order effects.

**Contents:**

The following topics are covered during the course: Ferrous metals and their properties. Principles of Eurocodes. Design of simple steel structure under base loading cases and loading combinations. Corrosion. Design of joints in steel structures. Composite structures with steel member. Section classification. Effective cross-section. Cross-sections with stiffeners. Steel members in bending and axial compression. Buckling, lateral torsional buckling, and torsion.

**Mode of delivery:**

Face-to-face.

**Learning activities and teaching methods:**

Lectures and exercises 52 h. Self-study 110 h. Total 162 h = 6 ECTS Credits.

**Target group:**

Degree students who study steel structure design.

**Prerequisites and co-requisites:**

466102A Introduction to Structural Design. Key notes in courses Statics, Strength of Materials I, Strength of Materials II, Energy principles and Their Use in Beam Structures, and Plates and Shells and Mechanics of materials

**Recommended or required reading:**

Lecture notes (in Finnish). Eurocodes 1990-1999.

**Assessment methods and criteria:**

Three midterm exams or one final exam is required. One design exercise is required.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Matti Kangaspuoskari

**ay466105S: Design of Steel Structures (OPEN UNI), 6 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opettajat:** Kangaspuoskari, Matti Johannes

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

466105S Design of Steel Structures 6.0 op

## ay488231S: Environmental Chemistry and Ecology (OPEN UNI), 5 op

**Voimassaolo:** 01.01.2019 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** English

**Leikkaavuudet:**

488231S Environmental Chemistry and Ecology 5.0 op

### ECTS Credits:

5 ECTS credits / 135 hours of work

### Language of instruction:

English

### Timing:

A 10 week intensive course is arranged twice per year: in the autumn semester and in the spring semester. For further information concerning the schedule please contact the teachers.

### Learning outcomes:

Upon completion of the course, the student has an understanding of the multidisciplinary nature and concept of the current environmental problems through the lens of (1) environmental chemistry and (2) environmental ecology. In addition, the student is able to consider how the circular economy tools can be applied to prevent and minimize environmental impacts.

### Contents:

A project work focusing on four major environmental concerns is done in groups of 4-5 students. In addition to the project work, there are individual course tasks.

### Mode of delivery:

Online studies.

### Learning activities and teaching methods:

Project work 100 h / Self-study 35 h

### Target group:

Students in all disciplines

### Assessment methods and criteria:

Project work and individual tasks will be assessed. Assessment criteria are based on the learning outcomes of the course. Read more about the course assessment and grading systems of the University of Oulu at [www oulu.fi/english/studying/assessment](http://www oulu.fi/english/studying/assessment).

### Grading:

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

### Person responsible:

University lecturer Minna Tiainen and university teacher Virpi Väisänen

## ay781309A: Environmental Chemistry for Chemistry Teachers, 5 op

**Voimassaolo:** 01.08.2020 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

781309A Environmental Chemistry 5.0 op

## **488143S: Environmental Impact Assessment, 5 op**

**Voimassaolo:** 28.11.2016 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Process and Environmental Engineering

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Hannu Marttila

**Opintokohteen kielet:** English

### **ECTS Credits:**

5 ECTS credits/133 hours of work

### **Language of instruction:**

English

### **Timing:**

The course is held in the autumn semester during the period 1

### **Learning outcomes:**

The student will acquire a broad and multidisciplinary and sustainable approach to environmental impact assessment (EIA). The student will know the all steps in EIA process and the different methods used in environmental impact assessment. During the course students develop their working life skills (e.g. writing, communication skills) and the ability to review environmental problems. They also learn how to resolve extensive environmental projects related problems, causes and consequences.

### **Contents:**

EIA process and legislation, environmental change, principles and assessment methods in ecology, hydrology, economics, energy issues and social sciences.

### **Mode of delivery:**

Face-to-face teaching, video lectures and project works.

### **Learning activities and teaching methods:**

The amount of lecture hours can varied depending teaching resources in every year but independent project working is the main activities in the course. Work load in the course is totally 133 h. The project work is completed as group or individual work.

### **Target group:**

Only master students in Water resources and environmental engineering major in the Environmental Engineering Master Program.

### **Recommended or required reading:**

Environmental Impact Assessment: Cutting Edge for the Twenty-First Century (Gilpin A, 1995, ISBN 0-521-42967-6). Lecture hand-outs and other materials delivered in lectures.

### **Assessment methods and criteria:**

The assignment (100 %). More information about assessment methods is given during the course.

### **Grading:**

The course unit utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Apulaisprofessori Hannu Marttila

**Working life cooperation:**

The course includes the video guest lectures from local companies and authorities. The assignment is based on case studies that are real on-going or passed EIA projects.

**Other information:**

Maximum number of the students in the course is 20.

**485308S: Foundation Engineering, 5 op**

**Voimassaolo:** 01.08.2020 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Civil Engineering field

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**485302A: Foundation Engineering, 5 op**

**Voimassaolo:** 01.08.2019 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Civil Engineering field

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay485302A Foundation Engineering (OPEN UNI) 5.0 op

488129S Foundation Engineering 5.0 op

**ECTS Credits:**

5 ECTS credits / 135 hours of work

**Language of instruction:**

Finnish

**Timing:**

The course unit is held in the autumn semester during period 2

**Learning outcomes:**

After completing the course, students know the basics of base construction plan, can identify geotechnical dimensioning limit states and use partial factor method. Student can describe different foundation methods, types and principles of typical foundation piles, excavation types, risks and principles of risk management, radon. Student knows the principles of foundation drainage and frost protection. Student knows the basics of how to design piled foundation. Student knows ultimate bearing capacity formula for shallow foundation (Eurocode).

**Contents:**

The basis of geotechnical design of foundations. Most common foundation types. Dimensioning of piled foundation. Ground improvement. Drainage. Filling and compression. Frost protection. Radon.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

Lectures and exercises (28 h), self-study (107 h)

**Target group:**

Students in bachelor's program of civil engineering

**Prerequisites and co-requisites:**

485301A basics of Geotechnics

**Recommended optional programme components:**

-

**Recommended or required reading:**

Materials delivered in lectures

**Assessment methods and criteria:**

Exam and assignment(s)

**Grading:**

The course unit utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Veikko Pekkala

**Working life cooperation:**

No

**Other information:**

This course will replace course 488129S Foundation Engineering.

**ay485302A: Foundation Engineering (OPEN UNI), 5 op**

**Voimassaolo:** 01.08.2020 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opettajat:** Veikko Pekkala

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

485302A	Foundation Engineering	5.0 op
488129S	Foundation Engineering	5.0 op

**ECTS Credits:**

5 ECTS credits / 135 hours of work

**Language of instruction:**

Finnish

**Timing:**

The course unit is held in the autumn semester during period 2

**Learning outcomes:**

After completing the course, students know the basics of base construction plan, can identify geotechnical dimensioning limit states and use partial factor method. Student can describe different foundation methods, types and principles of typical foundation piles, excavation types, risks and principles of risk management, radon. Student knows the principles of foundation drainage and frost protection. Student knows the basics of how to design piled foundation. Student knows ultimate bearing capacity formula for shallow foundation (Eurocode).

**Contents:**

The basis of geotechnical design of foundations. Most common foundation types. Dimensioning of piled foundation. Ground improvement. Drainage. Filling and compression. Frost protection. Radon.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

Lectures and exercises (28 h), self-study (107 h)

**Target group:**

Students in bachelor's program of civil engineering

**Prerequisites and co-requisites:**

485301A Basics of Geotechnics

**Recommended optional programme components:**

-

**Recommended or required reading:**

Materials delivered in lectures

**Assessment methods and criteria:**

Exam and assignment(s)

**Grading:**

The course unit utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Veikko Pekkala

**Working life cooperation:**

No

**Other information:**

This course will replace course 488129S Foundation Engineering.

**485304S: Fundamentals of Civil Engineering, 5 op****Voimassaolo:** 01.08.2019 -**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Civil Engineering field**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

488121S Fundamentals of Civil Engineering 5.0 op

**ECTS Credits:**

5 ECTS credits / 135 hours of work

**Language of instruction:**

Finnish

**Timing:**

The course unit is held in the autumn semester, during period 1

**Learning outcomes:**

The student understand how geotechnical design is joined to a part of society's decision-making processes. He or she can prepare an assessment of foundation properties and design reinforcement. He or she understands specialties of railway construction and vibration problems. He or she gets the knowledge of property and surface drainage methods, how to lower groundwater table and what kind of risks are included to earth slopes and how to reinforce those.

**Contents:**

Norms and instructions, basis of geotechnical design, earth and road structures, soil improvement, property and surface drainage, lowering of groundwater table, pipeline construction, specialties of railway construction and vibration problems, geotechnical monitoring and measurements, earthworks

**Mode of delivery:**

Face-to-face teaching

**Learning activities and teaching methods:**

Lectures (34 h) and design and calculation exercises (10 h) also self-study (91 h)

**Target group:**

Master students in the Civil Engineering program

**Prerequisites and co-requisites:**

Prerequisites: 485301A Basic of Geotechnics (former 488115A Geomechanics), 485201A Building information modeling and CAD (or similar AutoCAD knowledge)

**Recommended optional programme components:**

-

**Recommended or required reading:**

Lecture handout and other materials delivered in lectures

**Assessment methods and criteria:**

Examination and homeworks

**Grading:**

The course unit utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

University teacher Anne Tuomela

**Working life cooperation:**

The course includes guest lectures from various sectors of civil engineering.

**Other information:**

This course will replace course 488121S Fundamentals of Civil Engineering in Academic year 2020-21.

**780117P: General and Inorganic Chemistry A, 5 op****Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Chemistry

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

780120P	Basic Principles in Chemistry	5.0 op
ay780117P	General and Inorganic Chemistry A (OPEN UNI)	5.0 op
780115P	General and Inorganic Chemistry II	6.0 op
780114P	General and Inorganic Chemistry I	6.0 op
780113P	Introduction to Chemistry	12.0 op
780102P	Introduction to Inorganic Chemistry	5.0 op
780109P	Basic Principles in Chemistry	4.0 op

**ECTS Credits:**

5 credits / 134 hours of work

**Language of instruction:**

Finnish

**Timing:**

1st autumn

**Learning outcomes:**

After this course, the student:

- can explain organic and inorganic chemistry fundamentals, basic concepts and terminology.
- understand basic concepts of chemistry as described in international general chemistry curriculum.

**Contents:**

Basic concepts of chemistry, chemical formula, chemical reaction, chemical equation, oxidation-reduction reactions, stoichiometry, gases, chemical equilibrium, acids and bases, additional aspects of acid-base equilibria, solubility and complex-ion equilibria.

**Mode of delivery:**

Face-to-face teaching

**Learning activities and teaching methods:**

30 hours of lectures and applications, 20 hours of exercises and 85 hours of self-study.

**Target group:**

Biochemistry, Chemistry compulsory. In the entity of 25 credits (minor studies), compulsory.

Physical sciences, Mathematical sciences, optional.

**Prerequisites and co-requisites:**

Upper secondary school chemistry.

**Recommended optional programme components:**

-

**Recommended or required reading:**

Petrucci, R.H., Herring, F.G., Madura, J.D. ja Bissonnette, C.: General Chemistry: Principles and Modern Applications, 11. edition (also 7., 8., 9. ja 10. edition), Pearson Canada Inc., Toronto, 2017. Chapters 1-6, 14.2, 15-18.

**Assessment methods and criteria:**

Two intermediate examinations or one final examination.

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

**Grading:**

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

**Person responsible:**

Johanna Havia

**Working life cooperation:**

No

**Other information:**

No

**ay780117P: General and Inorganic Chemistry A (OPEN UNI), 5 op**

**Voimassaolo:** 01.01.2016 -



**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

780117P	General and Inorganic Chemistry A	5.0 op
780114P	General and Inorganic Chemistry I	6.0 op
780115P	General and Inorganic Chemistry II	6.0 op
780113P	Introduction to Chemistry	12.0 op
780101P	Introduction to Physical Chemistry	7.0 op
780102P	Introduction to Inorganic Chemistry	5.0 op
780109P	Basic Principles in Chemistry	4.0 op

**ECTS Credits:**

5 credits /134 hours of work

**Language of instruction:**

Finnish

**Timing:**

1st autumn

**Learning outcomes:**

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

**Contents:**

Basic concepts of chemistry, chemical formula, chemical reaction, chemical equation, oxidation-reduction reactions, stoichiometry, gases, chemical equilibrium, acids and bases, additional aspects of acid-base equilibria, solubility and complex-ion equilibria.

**Mode of delivery:**

Face-to-face teaching

**Learning activities and teaching methods:**

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

**Target group:**

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

**Prerequisites and co-requisites:**

Upper secondary school chemistry

**Recommended optional programme components:**

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

**Recommended or required reading:**

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

**Assessment methods and criteria:**

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

**Grading:**

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

**Person responsible:**

N.N.

**Working life cooperation:**

No

**Other information:**

No

## 780118P: General and Inorganic Chemistry B, 5 op

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Chemistry

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

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

**ECTS Credits:**

5 ECTS credits / 134 hours of work

**Language of instruction:**

Finnish

**Timing:**

1st autumn

**Learning outcomes:**

After this course, the student:

- can explain inorganic chemistry fundamentals, basic concepts and terminology
- understand basic concepts of chemistry as described in international general chemistry curriculum.

**Contents:**

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

**Mode of delivery:**

Face-to-face teaching

**Learning activities and teaching methods:**

32 hours of lectures and applications, 18 hours of exercises, 85 hours of self-study.

**Target group:**

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

**Prerequisites and co-requisites:**

Upper secondary school chemistry.

**Recommended optional programme components:**

-

**Recommended or required reading:**

Petrucci, R.H., Herring, F.G., Madura, J.D. ja Bissonnette, C.: General Chemistry: Principles and Modern Applications, 11. edition (also 7., 8., 9. ja 10. edition), Pearson Canada Inc., Toronto, 2017. Chapters 7-11.1-11.7, 12.1, 13, 19-20.

**Assessment methods and criteria:**

Two intermediate examinations or one final examination.

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

**Grading:**

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

**Person responsible:**

Matti Niemelä

**Working life cooperation:**

No

**Other information:**

No

**ay780118P: General and Inorganic Chemistry B (OPEN UNI), 5 op**

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

780118P	General and Inorganic Chemistry B	5.0 op
780114P	General and Inorganic Chemistry I	6.0 op
780115P	General and Inorganic Chemistry II	6.0 op
780113P	Introduction to Chemistry	12.0 op
780101P	Introduction to Physical Chemistry	7.0 op
780102P	Introduction to Inorganic Chemistry	5.0 op

**ECTS Credits:**

5 credits /134 hours of work

**Language of instruction:**

Finnish

**Timing:**

1st autumn

**Learning outcomes:**

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

**Contents:**

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

**Mode of delivery:**

Face-to-face teaching

**Learning activities and teaching methods:**

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

**Target group:**

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

**Prerequisites and co-requisites:**

Upper secondary school chemistry

**Recommended optional programme components:**

-

**Recommended or required reading:**

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

**Assessment methods and criteria:**

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

**Grading:**

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

**Person responsible:**

N.N.

**Working life cooperation:**

No

**Other information:**

No

## 485306S: Geoenvironmental Engineering, 5 op

**Voimassaolo:** 01.08.2019 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Civil Engineering field

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Tuomela, Anne Marika

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

488131S Geoenvironmental Engineering 5.0 op

**ECTS Credits:**

5 ECTS credits / 135 hours of work

**Language of instruction:**

Finnish

**Timing:**

The course unit is held in the autumn semester, during period 1

**Learning outcomes:**

The student knows norms and instruction which are related to contaminated sites. The students can choose the suitable remediation technique for contaminated soil. The student can calculate contaminant transport in soils. The student can also design geotechnical structures of industrial and domestic landfills and evaluate the needs for remediation of contaminated soils. Student knows how to use by-products from industry in different soil construction applications.

**Contents:**

Norms and instructions, a project work where student will discover a contaminated soil and make a proposal for remediation technique, properties of soil materials and industrial by-products, basis of geotechnical design for landfill environment, structures of dams and impoundments, geoenvironmental challenges in mining, remote sensing as a tool for geoenvironmental applications.

**Mode of delivery:**

Face-to-face teaching

**Learning activities and teaching methods:**

Lectures (44 h), group work (60 h) and independent work (31 h)

**Target group:**

Master students in the Civil Engineering program

**Prerequisites and co-requisites:**

485301A Basics of Geotechnics

**Recommended optional programme components:**

-

**Recommended or required reading:**

Lecture handout and other materials delivered in lectures

**Assessment methods and criteria:**

Written exam and exercises

**Grading:**

The course unit utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

University teacher Anne Tuomela

**Working life cooperation:**

The course includes a visit to a site decided later and also guest lectures from professionals in industry and administration.

**Other information:**

This course will replace course 488131S Geoenvironmental Engineering

## 477416S: High temperature processes, 5 op

**Voimassaolo:** 28.11.2016 - 31.07.2022

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Process and Environmental Engineering

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Eetu-Pekka Heikkinen

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

477427A High temperature processes 5.0 op

ay477416S High temperature processes (OPEN UNI) 5.0 op

**ECTS Credits:**

5 cr / 135 hours of work.

**Language of instruction:**

Finnish

**Timing:**

The course is held in the autumn semester, during period I. It is recommended to complete the course at the 4th autumn semester.

**Learning outcomes:**

Students passing the course are familiar with the metal production processes and metallurgical unit operations. Additionally, students know how to evaluate high temperature processes from different perspectives (energy and reductants, refractory materials, slags and ashes, waste and emissions as well as automation, measurements and modelling).

**Contents:**

The most important pyrometallurgical unit operations and other high temperature processes as well as things that need to be taken into account when considering high temperature processes (e.g. energy and reductants, refractory materials, slags and ashes, waste and emissions as well as automation, measurements and modelling).

**Mode of delivery:**

Classroom education

**Learning activities and teaching methods:**

Lectures (approximately 45 hours) supporting the exercises that are made during the course. Only in Finnish.

**Target group:**

Students of process metallurgy.

**Prerequisites and co-requisites:**

Knowledge and skills corresponding the knowledge and skills that are obtained from the Bachelor-level-studies in the programme of process or environmental engineering are recommended as prerequisites. In order to get credits from this course, bachelor thesis must be completed.

**Recommended optional programme components:**

This course is one of the courses of pyrometallurgy in the module of process metallurgy.

**Recommended or required reading:**

Material will be distributed during lectures and exercises. It is also available via courses www-site. Each student is required to search additional material for the exercises when necessary.

**Assessment methods and criteria:**

Continuous assessment consisting of exercises that are made during the course. Please note that the course is organised only in Finnish.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

University lecturer Eetu-Pekka Heikkinen

**Working life cooperation:**

The course includes a seminar day organized together with industry.

**Other information:**

Although it is not required to participate on lectures, it is highly recommended that the students are active and do the required exercises from the very beginning of the course due to continuous assessment used in this course.

## ay477416S: High temperature processes (OPEN UNI), 5 op

**Voimassaolo:** 01.08.2019 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

477416S High temperature processes 5.0 op

**ECTS Credits:**

5 cr / 135 hours of work.

**Language of instruction:**

Finnish

**Timing:**

The course is held in the autumn semester, during period I. It is recommended to complete the course at the 4th autumn semester.

**Learning outcomes:**

Students passing the course are familiar with the metal production processes and metallurgical unit operations. Additionally, students know how to evaluate high temperature processes from different perspectives (energy and reductants, refractory materials, slags and ashes, waste and emissions as well as automation, measurements and modelling).

**Contents:**

The most important pyrometallurgical unit operations and other high temperature processes as well as things that need to be taken into account when considering high temperature processes (e.g. energy and reductants, refractory materials, slags and ashes, waste and emissions as well as automation, measurements and modelling).

**Mode of delivery:**

Classroom education

**Learning activities and teaching methods:**

Lectures (approximately 45 hours) supporting the exercises that are made during the course. Only in Finnish.

**Target group:**

Students of process metallurgy.

**Prerequisites and co-requisites:**

Knowledge and skills corresponding the knowledge and skills that are obtained from the Bachelor-level-studies in the programme of process or environmental engineering are recommended as prerequisites. In order to get credits from this course, bachelor thesis must be completed.

**Recommended optional programme components:**

This course is one of the courses of pyrometallurgy in the module of process metallurgy.

**Recommended or required reading:**

Material will be distributed during lectures and exercises. It is also available via courses www-site. Each student is required to search additional material for the exercises when necessary.

**Assessment methods and criteria:**

Continuous assessment consisting of exercises that are made during the course. Please note that the course is organised only in Finnish.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

university lecturer Eetu-Pekka Heikkinen

**Working life cooperation:**

The course includes a seminar day organized together with industry.

**Other information:**

Due to continuous assessment used in this course, it is highly recommended that the students are present already in the first lecture.

**451535P: History of Architecture I, lecture course, 4 op**

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu School of Architecture

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Petri Vuojala

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay451535P History of Architecture I, lecture course (OPEN UNI) 4.0 op

**ECTS Credits:**

4 ECTS

**Language of instruction:**

Finnish

**Timing:**

Autumn term 1 and 2

**Learning outcomes:**

After completing the course the student can evaluate the interaction between style periods of European architectural history, technical development and social changes. The student can classify the different eras and recognize their most significant buildings and architects. After the course the student can interpret the classical language of architecture the classical grammar of architecture, as well as recognize the historical layers of built environment.

**Contents:**

Lectures discuss the general history of architecture and discipline of styles from prehistory until the end of 18<sup>th</sup> century and introduce old building methods like brickwork bonds and traditional vault constructions.

**Mode of delivery:**

Lectures, additionally independent studies

**Learning activities and teaching methods:**

Lessons 50 hrs

**Target group:**

1<sup>st</sup> year Bachelor level students

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

Course is combined to exercises (451536P)

**Recommended or required reading:**

Handouts, digital slides. A literature list will be delivered during the course.

**Assessment methods and criteria:**

Assessment is based on attendance, learning diary or written examination.

**Grading:**

1-5. Learning diary or written examination.

**Person responsible:**

Dos. Petri Vuojala

**Working life cooperation:**

-

**Other information:**

-

## ay451535P: History of Architecture I, lecture course (OPEN UNI), 4 op

**Voimassaolo:** 01.08.2019 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

451535P History of Architecture I, lecture course 4.0 op

**ECTS Credits:**

4 ECTS

**Language of instruction:**

Finnish

**Timing:**

Autumn term 1 and 2

**Learning outcomes:**

After completing the course the student can evaluate the interaction between style periods of European architectural history, technical development and social changes. The student can classify the different eras and recognize their most significant buildings and architects. After the course the student can interpret the classical language of architecture the classical grammar of architecture, as well as recognize the historical layers of built environment.

**Contents:**

Lectures discuss the general history of architecture and discipline of styles from prehistory until the end of 18<sup>th</sup> century and introduce old building methods like brickwork bonds and traditional vault constructions.

**Mode of delivery:**

Lectures, additionally independent studies

**Learning activities and teaching methods:**

Lessons 56 hrs

**Target group:**

1<sup>st</sup> year Bachelor level students

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

Course is combined to exercises (451536P)

**Recommended or required reading:**

Handouts, digital slides. A literature list will be delivered during the course.

**Assessment methods and criteria:**

Assessment is based on attendance, learning diary or written examination.

**Grading:**

1-5

**Person responsible:**

Professor Anna-Maija Ylimaula, University lecturer N.N.

**Working life cooperation:**

-

**Other information:**

-

## 451537A: History of Architecture II, lecture course, 3 op

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu School of Architecture

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Petri Vuojala

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay451537A History of Architecture II, lecture course (OPEN UNI) 3.0 op

**ECTS Credits:**

3

**Language of instruction:**

Finnish (literature partly in English)

**Timing:**

Spring term I and 2

**Learning outcomes:**

During the course the student learns to recognize the historical roots of the contemporary architecture and recount the development up to today. Having completed the course, the student recognizes the most essential phenomena and styles of 19th and 20th century architecture and can reflect own personal views on contemporary architecture.

**Contents:**

Course discusses the general history of architecture of 19th and 20th centuries.

**Mode of delivery:**

Lectures, additionally independent studies.

**Learning activities and teaching methods:**

Lectures 48 hrs

**Target group:**

1st year Bachelor's level students

**Prerequisites and co-requisites:**

History of architecture I, lecture course (451535P)

**Recommended optional programme components:**

Course is combined to practices (451538A)



**Recommended or required reading:**

Handouts, digital slides. A literature list will be handed out during the course

**Assessment methods and criteria:**

Assessment is based on attendance, learning diary or written examination

**Grading:**

1-5

**Person responsible:**

Dos. Petri Vuojala

**Working life cooperation:**

-

**Other information:**

-

**ay451537A: History of Architecture II, lecture course (OPEN UNI), 3 op**

**Voimassaolo:** 01.08.2019 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

451537A History of Architecture II, lecture course 3.0 op

**ECTS Credits:**

3

**Language of instruction:**

Finnish (literature partly in English)

**Timing:**

Spring term I and 2

**Learning outcomes:**

During the course the student learns to recognize the historical roots of the contemporary architecture and recount the development up to today. Having completed the course, the student recognizes the most essential phenomena and styles of 19th and 20th century architecture and can reflect own personal views on contemporary architecture.

**Contents:**

Course discusses the general history of architecture of 19th and 20th centuries.

**Mode of delivery:**

Lectures, additionally independent studies.

**Learning activities and teaching methods:**

Lectures 48 hrs

**Target group:**

1st year Bachelor's level students

**Prerequisites and co-requisites:**

History of architecture I, lecture course (451535P)

**Recommended optional programme components:**

Course is combined to practices (451538A)

**Recommended or required reading:**

Handouts, digital slides. A literature list will be handed out during the course

**Assessment methods and criteria:**

Assessment is based on attendance, learning diary or written examination

**Grading:**

1-5

**Person responsible:**

Professor Anna-Maija Ylimaula, University lecturer N.N.

**Working life cooperation:**

-

**Other information:**

-

## 451504A: History of Architecture III, 3 op

**Voimassaolo:** 01.08.2011 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu School of Architecture

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Petri Vuojala

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay451504A History of Architecture III (OPEN UNI) 3.0 op

**ECTS Credits:**

3

**Language of instruction:**

Finnish (literature in English and Swedish)

**Timing:**

Autumn term 2 and spring term I

**Learning outcomes:**

The aim is to provide basic knowledge on the history of the Scandinavian and Finnish architecture from the prehistory until the 20th century.

After completing the course the student masters the historical background of the architecture of Finland and Scandinavia starting from pre-historical times. The student recognizes the temporal and stylistic layers of the history of our building tradition and is able to explicate features of Finland's architectural evolution in a relation with the international development and especially in correlation to Sweden and the other Nordic countries.

**Contents:**

Lecture discusses the history of architecture in Scandinavia and especially in Finland from prehistory till 20th C.

**Mode of delivery:**

Lectures, additionally independent studies.

**Learning activities and teaching methods:**

Lectures 36 h

**Target group:**

3rd year Bachelor level students.

**Prerequisites and co-requisites:**

History of architecture I and II, lecture courses ( 451535P and 451537A )

**Recommended optional programme components:**

The course is related to the History of Architecture III, practices course (451505A). Together with the Architecture III, practices course, this course can form the Bachelor's diploma work (8 ECTS) of the Bachelor's degree.

**Recommended or required reading:**

Handouts, digital slides. A literature list will be handed out during the course.

**Assessment methods and criteria:**

Assessment is based learning diary or written examination.

**Grading:**

1-5

**Person responsible:**

Dos. Petri Vuojala

**Working life cooperation:**

-

**Other information:**

-

## ay451504A: History of Architecture III (OPEN UNI), 3 op

**Voimassaolo:** 01.08.2019 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

451504A History of Architecture III 3.0 op

**ECTS Credits:**

3

**Language of instruction:**

Finnish (literature in English and Swedish)

**Timing:**

Autumn term 2 and spring term I

**Learning outcomes:**

The aim is to provide basic knowledge on the history of the Scandinavian and Finnish architecture from the prehistory until the 20th century.

After completing the course the student masters the historical background of the architecture of Finland and Scandinavia starting from pre-historical times. The student recognizes the temporal and stylistic layers of the history of our building tradition and is able to explicate features of Finland's architectural evolution in a relation with the international development and especially in correlation to Sweden and the other Nordic countries.

**Contents:**

Lecture discusses the history of architecture in Scandinavia and especially in Finland from prehistory till 20th C.

**Mode of delivery:**

Lectures, additionally independent studies.

**Learning activities and teaching methods:**

Lectures 36 h

**Target group:**

3rd year Bachelor level students.

**Prerequisites and co-requisites:**

History of architecture I and II, lecture courses ( 451535P and 451537A )

**Recommended optional programme components:**

The course is related to the History of Architecture III, practices course (451505A). Together with the Architecture III, practices course, this course can form the Bachelor's diploma work (8 ECTS) of the Bachelor's degree.

**Recommended or required reading:**

Handouts, digital slides. A literature list will be handed out during the course.

**Assessment methods and criteria:**

Assessment is based learning diary or written examination.

**Grading:**

1-5

**Person responsible:**

Professor Anna-Maija Ylimaula, University lecturer N.N.

**Working life cooperation:**

-

**Other information:**

-

## 451513S: History of Interior Design / Historical interiors, 5 op

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu School of Architecture

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Virpi Harju

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay451513S History of Interior Design and Historical interiors (OPEN UNI) 5.0 op

**Voidaan suorittaa useasti:** Kyllä

Ei opintojaksokuvauksia.

## 488102A: Hydrological Processes, 5 op

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Process and Environmental Engineering

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay488102A Hydrological Processes (OPEN UNI) 5.0 op

480207A Hydraulics and Hydrology 5.0 op

### ECTS Credits:

5 ECTS credits / 133 hours of work

### Language of instruction:

Finnish, but also option to complete the course in English.

### Timing:

The course is held in the autumn semester during the period 1. It is recommended to complete the course at the 1st autumn semester of the international master program of environmental engineering.

### Learning outcomes:

After the course, the student understands and can describe the main hydrological processes, water movements and hydraulics phenomenon quantitatively through mathematical methods. The student also understands and quantifies the relation between state and flow with relation to snowmelt, evaporation, infiltration and groundwater flow.

### Contents:

Hydrological cycle, physical properties of water, distribution of water resources, water balance, precipitation, evapotranspiration, soil and ground water, infiltration, runoff, snow hydrology, hydrometry, water quality of rivers and lakes.

### Mode of delivery:

Face-to-face teaching and independent work with two assignment reports.

### Learning activities and teaching methods:

Lectures 24 h, exercises 16 h and independent work 93 h. Totally 133 h.

### Target group:

Students in international master programs of environmental engineering

### Prerequisites and co-requisites:

The recommended prerequisite is the completion of the following course or having corresponding knowledge prior to enrolling for the course unit: 477201A Material and Energy Balances and 477052A Fluid mechanics.

### Recommended optional programme components:

The course is a prerequisite for most of master level studies.

### Recommended or required reading:

Physical Hydrology (Dingman SL, 2002, 2nd Edition, ISBN 978-1-57766-561-8), Fluid Mechanics and Hydraulics (Giles, Evett and Liu, 3rd Edition, ISBN 0-07-020509-4)

### Assessment methods and criteria:

The assignments must be returned and passed with threshold of 50% in order to get final examination. The final grade of the course is weighted average of assignment reports (80%) and examination (20%).

### Grading:

The assignments must be returned and passed with threshold of 50% in order to get final examination. The final grade of the course is weighted average of assignment reports (80%) and examination (20%).

### Person responsible:

University Lecturer Anna-Kaisa Ronkanen

### Working life cooperation:

Examples solved in the lectures based on real problems

### Other information:

The English version of the course is organized parallel to Finnish version of the course.

## ay488102A: Hydrological Processes (OPEN UNI), 5 op

**Voimassaolo:** 01.08.2020 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opettajat:** Anna-Kaisa Ronkanen

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

488102A Hydrological Processes 5.0 op

### ECTS Credits:

5 ECTS credits / 133 hours of work

### Language of instruction:

Finnish, but also option to complete the course in English.

### Timing:

The course is held in the autumn semester during the period 1. It is recommended to complete the course at the 1st autumn semester of the international master program of environmental engineering.

### Learning outcomes:

After the course, the student understands and can describe the main hydrological processes, water movements and hydraulics phenomenon quantitatively through mathematical methods. The student also understands and quantifies the relation between state and flow with relation to snowmelt, evaporation, infiltration and groundwater flow.

### Contents:

Hydrological cycle, physical properties of water, distribution of water resources, water balance, precipitation, evapotranspiration, soil and ground water, infiltration, runoff, snow hydrology, hydrometry, water quality of rivers and lakes.

### Mode of delivery:

Face-to-face teaching and independent work with two assignment reports.

### Learning activities and teaching methods:

Lectures 24 h, exercises 16 h and independent work 93 h. Totally 133 h.

### Target group:

Students in international master programs of environmental engineering

### Prerequisites and co-requisites:

The recommended prerequisite is the completion of the following course or having corresponding knowledge prior to enrolling for the course unit: 477201A Material and Energy Balances and 477052A Fluid mechanics.

### Recommended optional programme components:

The course is a prerequisite for most of master level studies.

### Recommended or required reading:

Physical Hydrology (Dingman SL, 2002, 2nd Edition, ISBN 978-1-57766-561-8), Fluid Mechanics and Hydraulics (Giles, Evett and Liu, 3rd Edition, ISBN 0-07-020509-4)

### Assessment methods and criteria:

The assignments must be returned and passed with threshold of 50% in order to get final examination. The final grade of the course is weighted average of assignment reports (80%) and examination (20%).

### Grading:

The assignments must be returned and passed with threshold of 50% in order to get final examination. The final grade of the course is weighted average of assignment reports (80%) and examination (20%).

### Person responsible:

University Lecturer Anna-Kaisa Ronkanen

### Working life cooperation:

Examples solved in the lectures based on real problems

### Other information:

The English version of the course is organized parallel to Finnish version of the course.

## 450547A: Indesign Basics, 1 op

**Voimassaolo:** 01.08.2011 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu School of Architecture

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Asko Leinonen

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay450547A Indesign Basics (OPEN UNI) 1.0 op

**ECTS Credits:**

1

**Language of instruction:**

Finnish

**Timing:**

-

**Learning outcomes:**

Students master the basic page layout features and understand the possibilities of the software. Students are able to produce pages ready for release combining visual and textual material from various sources.

**Contents:**

Placing formatted text and pictures, page layout and PDF publishing.

**Mode of delivery:**

Lectures and course work.

**Learning activities and teaching methods:**

-

**Target group:**

The bachelor students of Oulu School of Architecture

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

Software help files and handouts.

**Assessment methods and criteria:**

Based on a project work (the presentation material of a design course at the Department of Architecture or an equivalent work).

**Grading:**

Pass / fail

**Person responsible:**

n.n.

**Working life cooperation:**

Students will learn to use the basic skills of Adobe InDesign publishing software and apply those skills in practical work. Students can use style settings in InDesign to make well controlled text and graphic layouts in hands-on work.

**Other information:**

Basic features of page layout in Indesign. The course is intended for the students of Oulu school of Architecture only.

## ay450547A: Indesign Basics (OPEN UNI), 1 op

**Voimassaolo:** 01.08.2019 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

450547A Indesign Basics 1.0 op

**ECTS Credits:**

1

**Language of instruction:**

Finnish

**Timing:**

workshop-type weekend course, the course is organized at most once per academic year.

**Learning outcomes:**

Students master the basic page layout features and understand the possibilities of the software. Students are able to produce pages ready for release combining visual and textual material from various sources.

**Contents:**

Placing formatted text and pictures, page layout and PDF publishing.

**Mode of delivery:**

workshop

**Learning activities and teaching methods:**

Contact teaching 16 h, independent exercises 11 h.

**Target group:**

-

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

Software help files

**Assessment methods and criteria:**

Based on a project work (the presentation material of a design course at the Oulu School of Architecture or an equivalent work).

**Grading:**

1-5

**Person responsible:**

n.n.

**Working life cooperation:**

Students will learn to use the basic skills of Adobe InDesign publishing software and apply those skills in hands-on work. Students can use style settings in InDesign to make well controlled text and graphic layouts.

**Other information:**

Basic features of page layout in Indesign.

The course is intended for registered students of the Oulu School of Architecture only.

## **ayA440190: Industrial Engineering and Management (IEM) Minor Subject Studies (OPEN UNI), 25 op**

**Voimassaolo:** 01.01.2014 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Study module

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

A440190 Industrial Engineering and Management (IEM) Minor Subject Studies 25.0 op

*Compulsory*

**ay555225P: Basics of industrial engineering and management (OPEN UNI), 5 op**

**Voimassaolo:** 01.01.2014 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opettajat:** Elina Jääskä

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

555225P Basics of industrial engineering and management 5.0 op

**ay555285A: Project management (OPEN UNI), 5 op**

**Voimassaolo:** 01.01.2014 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opettajat:** Kirsi Aaltonen

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

555288A Project Management 5.0 op

555285A Project management 5.0 op

**ay555286A: Process and quality management (OPEN UNI), 5 op**

**Voimassaolo:** 01.01.2014 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opettajat:** Osmo Kauppila

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

555286A Process and quality management 5.0 op

**ay555264P: Managing well-being and quality of working life (OPEN UNI), 5 op**

**Voimassaolo:** 01.01.2014 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish



**Leikkaavuudet:**

555264P Managing well-being and quality of working life 5.0 op

**ay555242A: Product development (OPEN UNI), 5 op**

**Voimassaolo:** 01.01.2014 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opettajat:** Kai Hänninen

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

555242A Product development 5.0 op

**771113P: Introduction to Geology I, 5 op**

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu Mining School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Kari Strand

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay771113P Introduction to Geology I (OPEN UNI) 5.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

Finnish

**Timing:**

1st year autumn

**Learning outcomes:**

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

**Contents:**

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

**Mode of delivery:**

Face to face

**Learning activities and teaching methods:**

36 h lectures, 6 h exercises

**Target group:**

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

**Prerequisites and co-requisites:**

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

**Recommended optional programme components:**

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

**Recommended or required reading:**

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

**Assessment methods and criteria:**

Written examination and identification test of rock types.

**Grading:**

5-1/fail

**Person responsible:**

Kari Strand

**Working life cooperation:**

No

**ay771113P: Introduction to Geology I (OPEN UNI), 5 op**

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

771113P Introduction to Geology I 5.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

Finnish

**Timing:**

1st year autumn

**Learning outcomes:**

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

**Contents:**

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

**Mode of delivery:**

Face to face

**Learning activities and teaching methods:**

36 h lectures, 6 h exercises

**Target group:**

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

**Prerequisites and co-requisites:**

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

**Recommended optional programme components:**

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

**Recommended or required reading:**

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

**Assessment methods and criteria:**

Written examination and identification test of rock types.

**Grading:**

5-1/fail

**Person responsible:**

Eero Hanski

**Working life cooperation:**

No

**771113P-02: Introduction to Geology I, Rock identification, 0 op**

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Basic Studies

**Laji:** Partial credit

**Vastuuyksikkö:** Oulu Mining School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Eero Hanski

**Opintokohteen kielet:** Finnish

**771113P-01: Introduction to Geology I, lectures, 0 op**

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Basic Studies

**Laji:** Partial credit

**Vastuuyksikkö:** Oulu Mining School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Kari Strand

**Opintokohteen kielet:** Finnish

**Voidaan suorittaa useasti:** Kyllä

**771114P: Introduction to Geology II, 5 op**

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu Mining School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Juha Pekka Lunkka

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

5 ECTS / 133 hours of work

**Language of instruction:**

Finnish

**Timing:**

1st year autumn

**Learning outcomes:**

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

**Contents:**

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

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

16 h lectures, 8 h exercises

**Target group:**

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

**Prerequisites and co-requisites:**

No

**Recommended or required reading:**

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

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

**Assessment methods and criteria:**

Obligatory exercises and written examination

**Grading:**

5-1/fail

**Person responsible:**

Juha Pekka Lunkka and Tiina Eskola

**Working life cooperation:**

No

**780116P: Introduction to Organic Chemistry, 5 op**

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Chemistry

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

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

**ECTS Credits:**

5 ECTS credits / 134 hours of work

**Language of instruction:**

Finnish. Book-examination in English as well.

**Timing:**

1st spring

**Learning outcomes:**

After this course, the student:

- can recognize and name basic organic compounds and explain their properties.
- can explain organic chemistry basic concepts.
- can deduce basic reaction types and solve their mechanisms.

**Contents:**

Classification of organic compounds and their properties. Basic reactions of organic compounds: addition, elimination and substitution along with the reaction mechanisms. Basics of stereochemistry.

**Mode of delivery:**

Face-to-face teaching

**Learning activities and teaching methods:**

38 hours of lectures plus 12 hours of exercises, 84 hours of independent self-study.

**Target group:**

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

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

**Prerequisites and co-requisites:**

Upper secondary school chemistry

**Recommended optional programme components:**

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

**Recommended or required reading:**

Hart, H.: Organic Chemistry: A Short Course, 10. ed. or newer, Houghton Mifflin, Boston, 1999; Hart, H. ja Hart, D.: Study Guide & Solutions Book, Organic Chemistry: A Short Course, 10. ed. or newer, Houghton Mifflin, Boston, 1999 and material in Moodle.

**Assessment methods and criteria:**

Two intermediate examinations or one final examination.

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

**Grading:**

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

**Person responsible:**

Johanna Kärkkäinen

**Working life cooperation:**

No

## ay780116P: Introduction to Organic Chemistry (OPEN UNI), 5 op

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

780116P Introduction to Organic Chemistry 5.0 op

**ECTS Credits:**

5 credits /134 hours of work

**Language of instruction:**

Finnish. Book-examination in English as well.

**Timing:**

1st autumn and 1st spring

**Learning outcomes:**

After this course, the student can explain organic chemistry fundamentals, basic concepts and terminology, can use them for the description of organic chemistry phenomena. He/she can name organic structures, explain their properties, deduce basic reaction types and solve their mechanisms.

**Contents:**

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

**Mode of delivery:**

Face-to-face teaching

**Learning activities and teaching methods:**

42 hours of lectures plus 12 hours of exercises, 80 hours of independent self-study

**Target group:**

Biochemistry, Chemistry, Biology, Process Engineering, Environmental Engineering and in the study entity of 25 credits, compulsory. Physical Sciences, Geology, Geography, Mathematical Sciences, optional.

**Prerequisites and co-requisites:**

Upper secondary school chemistry

**Recommended optional programme components:**

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

**Recommended or required reading:**

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

**Assessment methods and criteria:**

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

**Grading:**

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

**Person responsible:**

Dr. Johanna Kärkkäinen

**Working life cooperation:**

No

**Other information:**

No

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

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu Mining School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Juha Pekka Lunkka

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

5 ECTS / 133 hours of work

**Language of instruction:**

Finnish

**Timing:**

1st year spring

**Learning outcomes:**

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

**Contents:**

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

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

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

**Target group:**

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

**Prerequisites and co-requisites:**

Introduction to Geology II (771114P) or equivalent knowledge

**Recommended or required reading:**

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

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

**Assessment methods and criteria:**

Written examination

**Grading:**

5-1/fail

**Person responsible:**

Juha Pekka Lunkka

**Working life cooperation:**

No

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

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu Mining School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Kari Strand

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

5 credits

**Language of instruction:**

Finnish

**Timing:**

1st year spring

**Learning outcomes:**

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

**Contents:**

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

**Mode of delivery:**

Face to face

**Learning activities and teaching methods:**

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

**Target group:**

Major and minor subject students starting studies in geology.

**Prerequisites and co-requisites:**

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

**Recommended or required reading:**

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

**Assessment methods and criteria:**

Written examination.

**Grading:**

5-1/fail

**Person responsible:**

Eero Hanski

**Working life cooperation:**

No

## 491101P: Introduction to mining, 5 op

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu Mining School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Saija Luukkanen

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

5 cr

**Language of instruction:**

Finnish. Materials possibly partly in English.

**Timing:**

Autumn term, period 1

**Learning outcomes:**

After completing the course student can explain the various stages of mine value chain from exploration until the final concentrate. A student understands economical, social and environmental aspects of sustainable mining.

**Contents:**

Different stages of mine development: exploration, environmental aspects, geochemical and geophysical measurements, basics in mining engineering and mineral processing.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

Lectures, practicals, final exam

**Target group:**

Bachelor's students in mining engineering and mineral processing, geosciences and process engineering

**Recommended or required reading:**

Online materials presented during the lectures

**Assessment methods and criteria:**

Final exam, practicals, activity

**Grading:**

5-1/failed

**Person responsible:**

Prof. Saija Luukkanen

## 491102P: Introduction to solid earth geophysics, 5 op

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu Mining School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Moisio, Kari Juhani

**Opintokohteen kielet:** Finnish

**Timing:**

Spring semester, period 3. Recommended at 1st or 2nd year of the Bachelor studies.

**Learning outcomes:**

Upon the completion of the course, a student can describe the position and role of geophysics in the field of the Earth system sciences, can describe the structure of the Earth and its neighbouring environment in space (spheres), their internal geophysical properties and the interactions between different spheres, can describe large scale transfer (movement) of rock material inside the Earth and on its surface (convection, plate tectonics) and can name most common geophysical research methods.

**Contents:**

An overview of geophysics. Solid Earth geo-physics and Earth Sciences. Properties, structure and dynamics of the Earth. Earth as a planet: shape, size, rotation, revolution. Earth's gravitational field. Isostasy. Deformation and rheology. Seismology: seismic waves and the internal structure of the Earth. Earth's geomagnetic field.

Geothermics. Electric and electromagnetic methods.

**Learning activities and teaching methods:**

A specific target group is written in this field.

**Prerequisites and co-requisites:**

No specific prerequisites.

**Recommended or required reading:**

Lecture materials. U. Borén, E. Hjelt, S.-E., Karjalainen, T. ja Sirviö, J., 2014. Geofysiikka, Tunne maapalloasi.

WSOY, 191 p. Additional recommended reading: Musset, A.E. and Aftab Khan, M., 2000: Looking into the Earth: an introduction to geological geophysics. Cambridge University Press, 470 pp. ja Lowrie, W., 1997. Fundamentals of geophysics. Cambridge University press, 354 p.

**Assessment methods and criteria:**

Variable grading and evaluation methods

**Grading:**

1-5/fall

**Person responsible:**

Kari Moisio

**Working life cooperation:**

No working life cooperation



**ay477221A: Material and Energy Balances (OPEN UNI), 5 op****Voimassaolo:** 01.08.2019 -**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** University of Oulu, Open University**Arvostelu:** 1 - 5, pass, fail**Opetus suunnattu:** University of Oulu, Open University**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

ay477231A	Material and Energy Balances I (OPEN UNI)	2.0 op
ay477232A	Material and Energy Balances II (OPEN UNI)	3.0 op
477221A	Material and Energy Balances	5.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

Finnish

**Timing:**

2.9.2019-28.5.2020

**Learning outcomes:**

The student is able to formulate material and energy balances for a process by taking into account the restrictions set by reaction stoichiometry. The student knows how the created mathematical formulation can be exploited in process consideration.

**Contents:**

Formulation of material and energy balances by taking into account the effects of chemical reactions.

**Mode of delivery:**

web-based course

**Learning activities and teaching methods:**

web-based course

**Prerequisites and co-requisites:**

High school level chemistry, mathematics and physics.

**Recommended or required reading:**

Introduction to Material and Energy Balances. John Wiley & Sons, 1983. ISBN 0-471-041319. Learning material in a learning environment.

**Assessment methods and criteria:**

During the course, there are scheduled exercise packages that must be passed.

**Grading:**

1 - 5, pass, fail

**ay477231A: Material and Energy Balances I (OPEN UNI), 2 op****Voimassaolo:** 01.01.2020 -**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** University of Oulu, Open University**Arvostelu:** 1 - 5, pass, fail**Opetus suunnattu:** University of Oulu, Open University**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

477231A	Material and Energy Balances I	2.0 op
ay477221A	Material and Energy Balances (OPEN UNI)	5.0 op
477221A	Material and Energy Balances	5.0 op

## ay477232A: Material and Energy Balances II (OPEN UNI), 3 op

**Voimassaolo:** 01.01.2020 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opettajat:** Ahola, Juha Lennart

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

477232A	Material and Energy Balances II	3.0 op
477221A	Material and Energy Balances	5.0 op
ay477221A	Material and Energy Balances (OPEN UNI)	5.0 op

## 452561S: Modern Wood Architecture, 15 op

**Voimassaolo:** 01.09.2020 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu School of Architecture

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Matti Sanaksenaho

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay452561S	Modern Wood Architecture (OPEN UNI)	7.0 op
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**ECTS Credits:**

15 ECTS

**Language of instruction:**

Finnish

**Timing:**

Autumn term I and II

**Learning outcomes:**

After completing the course the student understands special features related to massive-wood building in the context of different phases (from sketches to implementation) of the architectural design.

The studied load-bearing structures dealt with are especially log and CLT, but also some most common structural massive-wood products, such as LVL and glue-free solutions are introduced. In addition to the basic questions related to the quality and characteristics of the massive-wood architecture, the student will learn about common structural systems, their dimensions and spans, principles for stiffening, possible restrictions, demands for the fire-safety, acoustics, thermal performance, moisture handling, visible joints and reservations for technical installations. Moreover, the student will understand the dimensions and weights of the prefabricated modules in relation to their production, transportation and construction.

**Contents:**

Massive-wood building products, and systems in architectural design. The process of architectural design from the sketches to the implementation design.

**Mode of delivery:**

Web-based teaching, launch seminar and final seminar as a contact teaching.

**Learning activities and teaching methods:**

Contact teaching (10 hours) / independent working (395 hours)

**Target group:**

Master-level students of architecture and building construction, graduated architects / construction architects and other professionals in the field.

**Prerequisites and co-requisites:**

Bachelor's degree completed.

**Recommended or required reading:**

Web-based lectures and listed literature / materials.

**Assessment methods and criteria:**

The course consists of four modular tasks and preparation of a learning portfolio. Besides these the student will prepare two presentations and participates to the web-discussion. Moreover, the students will evaluate each other's learning portfolios. The course is passed when these are completed.

**Grading:**

accepted/rejected

**Person responsible:**

Professors Anssi Lassila, Matti Sanaksenaho, Janne Pihlajaniemi, teacher/researcher Matti Lakkala

**Working life cooperation:**

Web lectures provided by the experts. The learning material provided by wood production industry.

**485109A: Numerical methods in structural engineering, 5 op**

**Voimassaolo:** 01.08.2019 - 31.07.2021

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Civil Engineering field

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

485121S Numerical methods in structural engineering 5.0 op

466103A Project work in structural engineering 5.0 op

**ECTS Credits:**

5 ETCS / 135 hours of work

**Language of instruction:**

Lectures in Finnish. Lecture notes in English. Foreign students can participate by studying independently the material and by carrying out the exercise work and exam in English.

**Timing:**

The course is held in the spring semester, during periods 3 and 4. It is recommended to complete the course during the 4th year of studies.

**Learning outcomes:**

Ability to carry out structural analysis by using advanced numerical simulation technology. Knowledge of and ability to develop methods for verification of model data and accuracy of numerical solutions. Ability to present results of calculations in writing. Knowledge of different variational and energy principles of mechanics and ability to apply them in structural analysis. Knowledge of the properties of different structural models and ability to formulate an appropriate and validated mathematical model for specific problems. Knowledge of some special features concerning the analysis and dimensioning of steel, concrete and timber structures. Knowledge of special features of plate and shell structures from the viewpoint of structural design.

**Contents:**

Introduction. Simulation governance. Principles of elasticity theory and calculus of variations. Bar, beam and arch structures. Plate and shell structures. Structural dynamics and stability.

**Mode of delivery:**

Face-to-face and independent study.

**Learning activities and teaching methods:**

Lectures and exercises 48 h, project work 24 h and independent work 63 h.

**Target group:**

Master level students in the study areas of structural engineering and engineering mechanics in the degree programs of civil and mechanical engineering, respectively.

**Prerequisites and co-requisites:**

Basic knowledge of statics, solid mechanics and differential & integral calculus.

**Recommended optional programme components:**

The course supports advanced courses in structural engineering and engineering mechanics.

**Recommended or required reading:**

Lecture notes and other electronic material.

**Assessment methods and criteria:**

The course is passed by partial exams during the course or by a final exam. A project work is also required.

**Grading:**

Numerical grading scale 1-5. Grade 0 stands for a fail.

**Person responsible:**

Senior research fellow Antti H. Niemi

**Working life cooperation:**

-

**Other information:**

-

## 450541A: Photoshop, Advanced Photomanipulation, 2 op

**Voimassaolo:** 01.08.2011 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu School of Architecture

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Asko Leinonen

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay450541A Photoshop, Advanced Photomanipulation (OPEN UNI) 2.0 op

**ECTS Credits:**

2

**Language of instruction:**

Finnish

**Timing:**

-

**Learning outcomes:**

Students are able to complete image renderings from 3d modelling software and to supplement them by combining elements from photos for a photorealistic and expressive end-result.

**Contents:**

Color correction, perspective correction, layers.

**Mode of delivery:**

Workshop lectures and course work.

**Learning activities and teaching methods:**

Workshop

**Target group:**

The bachelor students of Oulu School of Architecture

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

Software help files and handouts.

**Assessment methods and criteria:**

The student participates in the Photoshop workshop and completes the given course work.

**Grading:**

Pass / fail

**Person responsible:**

N.N.

**Working life cooperation:**

Students will learn to use the advanced skills of Adobe Photoshop software and apply those skills in hands-on work such as finishing conceptual drawing renderings.

**Other information:**

Adding a finishing touch in Photoshop to images produced with other rendering software. The course is intended for the students of Oulu School of Architecture only.

## ay450541A: Photoshop, Advanced Photomanipulation (OPEN UNI), 2 op

**Voimassaolo:** 01.08.2019 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

450541A Photoshop, Advanced Photomanipulation 2.0 op

**ECTS Credits:**

2

**Language of instruction:**

Finnish

**Timing:**

workshop-type weekend courses, the course is organized once per academic year.

**Learning outcomes:**

Students are able to complete image renderings from 3d modelling software and to supplement them by combining elements from photos for a photorealistic and expressive end-result.

**Contents:**

Color correction, perspective correction.

**Mode of delivery:**

2 weekend workshop including lectures and exercises.

**Learning activities and teaching methods:**

Contact teaching 32 h, independent exercises 22 h.

**Target group:**

-

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

Software help files and handouts.

**Assessment methods and criteria:**

Based on a project work (the presentation material of a design course at the Oulu School of Architecture or an equivalent work).

**Grading:**

1-5

**Person responsible:**

N.N.

**Working life cooperation:**

Students will learn to use the advanced skills of Adobe Photoshop software and apply those skills in hands-on work such as finishing conceptual drawing renderings.

**Other information:**

Adding a finishing touch in Photoshop to images produced with other rendering software. The course is intended for the students of the Oulu School of Architecture only

## 493300A: Principles of mineral processing, 5 op

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu Mining School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Saija Luukkanen

**Opintokohteen kielet:** English, Finnish

**Leikkaavuudet:**

ay493300A Principles of mineral processing (OPEN UNI) 5.0 op

**ECTS Credits:**

5 ECTS / 133 hours of work

**Language of instruction:**

Finnish; material mainly in English

**Timing:**

2nd period in the autumn. Recommended for the 3<sup>rd</sup> year students.

**Learning outcomes:**

Upon completion the course the student can explain the main unit process used in ore beneficiation and understands the main chemical and mineralogical factors playing the key role in process development. The student is able to calculate the most relevant process related calculations, such as mass balances, concentrate recoveries and grindability. The student is aware of the environmental as well as H&S aspects of mineral processing.

**Contents:**

The main unit processes used in mineral processing. Understanding how the mineralogy and chemistry of the ore influences in the process development.

**Mode of delivery:**

Mainly face-to-face teaching

**Learning activities and teaching methods:**

Lectures, demonstrations, assignments

**Target group:**

Student with mineral processing as major; students of mining engineering, geosciences and process engineering

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

The material provided during the course. B.A. Wills: Mineral processing technology

**Assessment methods and criteria:**

Final exam, home works and practicals, energy

**Grading:**

1-5/fail

**Person responsible:**

Saija Luukkanen

**Working life cooperation:**

No

**Other information:**

-

**ay493300A: Principles of mineral processing (OPEN UNI), 5 op**

**Voimassaolo:** 01.08.2019 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish, English

**Leikkaavuudet:**

493300A Principles of mineral processing 5.0 op

**ECTS Credits:**

5 ECTS / 133 hours of work

**Language of instruction:**

Finnish; material mainly in English

**Timing:**

2nd period in the autumn. Recommended for the 3<sup>rd</sup> year students.

**Learning outcomes:**

Upon completion the course the student can explain the main unit process used in ore beneficiation and understands the main chemical and mineralogical factors playing the key role in process development. The student is able to calculate the most relevant process related calculations, such as mass balances, concentrate

recoveris and grindability. The student is aware of the environmental as well as H&S aspects of mineral processing.

**Contents:**

The main unit processes used in mineral processing. Understanding how the mineralogy and chemistry of the ore influences in the process development.

**Mode of delivery:**

Mainly face-to-face teaching

**Learning activities and teaching methods:**

Lectures, demonstrations, assignments

**Target group:**

Student with mineral processing as major; students of mining engineering, geosciences and process engineering

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

The material provided during the course. B.A. Wills: Mineral processing technology

**Assessment methods and criteria:**

Final exam, home works and practicals, energy

**Grading:**

1-5/fail

**Person responsible:**

Saija Luukkanen

**Working life cooperation:**

No

**Other information:**

-

## 477524S: Process Optimization, 5 op

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Process and Environmental Engineering

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Aki Sorsa

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay477524S Process Optimization (OPEN UNI) 5.0 op

477504S Process Optimization 4.0 op

**ECTS Credits:**

5 ECTS /135 hours of work

**Language of instruction:**

English

**Timing:**

Spring semester, the 3th period. Recommended for 1st year M.Sc. students.

**Learning outcomes:**

Student can use and apply standard unconstrained and constrained optimization methods. Student understands the basic of evolutionary optimization algorithms and can use them. Student can define and identify optimization problems. Student is able to summarize the role of optimization in process engineering.

**Contents:**

Basic concepts of optimization. Optimization of unconstrained and constrained functions. Linear programming. Trajectory optimization. Evolutionary algorithms in optimization. Applications in process engineering.

**Mode of delivery:**

Face-to-face teaching and exercises.

**Learning activities and teaching methods:**

The amount of guided teaching is 40 hrs. Contact teaching includes, depending on situation, lectures, group work and tutored group work. During self-study time student does independent or group work.

**Target group:**

M.Sc. students of process and environmental engineering and M.Sc. students interested in process optimization. Exchange and other international students.

**Prerequisites and co-requisites:**

No prerequisites but basic understanding on numerical methods and process modelling are useful.

**Recommended optional programme components:**

See prerequisites

**Recommended or required reading:**

Reading materials. Ray, W.H. & Szekely, J. (1973) Process Optimization with Applications in Metallurgy and Chemical Engineering. John Wiley & Sons.

**Assessment methods and criteria:**

This course uses continuous assessment that includes homework and classroom or home exams.

**Grading:**

The course unit uses a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Aki Sorsa

**Working life cooperation:**

No

## ay477524S: Process Optimization (OPEN UNI), 5 op

**Voimassaolo:** 01.08.2020 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opettajat:** Aki Sorsa

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

477524S Process Optimization 5.0 op

**ECTS Credits:**

5 ECTS /135 hours of work

**Language of instruction:**

English

**Timing:**

Spring semester, the 3th period. Recommended for 1st year M.Sc. students.

**Learning outcomes:**

Student can use and apply standard unconstrained and constrained optimization methods. Student understands the basic of evolutionary optimization algorithms and can use them. Student can define and identify optimization problems. Student is able to summarize the role of optimization in process engineering.

**Contents:**

Basic concepts of optimization. Optimization of unconstrained and constrained functions. Linear programming. Trajectory optimization. Evolutionary algorithms in optimization. Applications in process engineering.

**Mode of delivery:**

Face-to-face teaching and exercises.

**Learning activities and teaching methods:**

The amount of guided teaching is 40 hrs. Contact teaching includes, depending on situation, lectures, group work and tutored group work. During self-study time student does independent or group work.

**Target group:**

M.Sc. students of process and environmental engineering and M.Sc. students interested in process optimization. Exchange and other international students.

**Prerequisites and co-requisites:**

No prerequisites but basic understanding on numerical methods and process modelling are useful.

**Recommended optional programme components:**

See prerequisites

**Recommended or required reading:**

Reading materials. Ray, W.H. & Szekely, J. (1973) Process Optimization with Applications in Metallurgy and Chemical Engineering. John Wiley & Sons.

**Assessment methods and criteria:**



This course uses continuous assessment that includes homework and classroom or home exams.

**Grading:**

The course unit uses a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Aki Sorsa

**Working life cooperation:**

No

## 477501A: Process dynamics, 5 op

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Process and Environmental Engineering

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Aki Sorsa

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay477501A Process Control Engineering I 5.0 op

470431A Process Control Engineering I 5.0 op

**ECTS Credits:**

5 ECTS /133 hours of work

**Language of instruction:**

Finnish/English. The main lecturing language is Finnish, but the course can also be taken in English with some special arrangements. Contact the responsible person.

**Timing:**

Negotiable (for the English version).

**Learning outcomes:**

After the course, the student understands the basic principles of dynamical behaviour of different processes, can write dynamic mass and energy balances for unit processes, and can solve these with the help of the transfer function approach. He knows also the connection between process control and process dynamics.

**Contents:**

Basics of process models and dynamics. Dynamic models. Lumped and distributed parameter models. Practical examples of different unit processes such as chemical reactors and heat exchangers. Modelling of large-scale processes.

**Mode of delivery:**

Negotiable (the course can be taken in English with some special arrangements - contact the responsible person).

**Learning activities and teaching methods:**

Solving exercise problems; textbook.

**Target group:**

Exchange and other international students (for the English version).

**Prerequisites and co-requisites:**

No course requirements.

**Recommended optional programme components:**

The course forms a basis to the advanced courses in the field of control engineering.

**Recommended or required reading:**

Lecture handout and other material distributed at the lecture.

Recommended for supplementary literature: Luyben, W.L.: Process Modeling, Simulation and Control for Chemical Engineers. McGraw-Hill cop., New York 1990, 725 p.

**Assessment methods and criteria:**

Homework and written/oral test

**Grading:**

The course unit utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail. Read more about [assessment criteria](#) at the University of Oulu webpage.

**Person responsible:**

Aki Sorsa

**Working life cooperation:**

No

**ay477501A: Process dynamics (OPEN UNI), 5 op****Voimassaolo:** 01.08.2020 -**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** University of Oulu, Open University**Arvostelu:** 1 - 5, pass, fail**Opetus suunnattu:** University of Oulu, Open University**Opettajat:** Aki Sorsa**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

477501A Process Control Engineering I 5.0 op

**ECTS Credits:**

5 ECTS /133 hours of work

**Language of instruction:**

Finnish/English. The main lecturing language is Finnish, but the course can also be taken in English with some special arrangements. Contact the responsible person.

**Timing:**

Negotiable (for the English version).

**Learning outcomes:**

After the course, the student understands the basic principles of dynamical behaviour of different processes, can write dynamic mass and energy balances for unit processes, and can solve these with the help of the transfer function approach. He knows also the connection between process control and process dynamics.

**Contents:**

Basics of process models and dynamics. Dynamic models. Lumped and distributed parameter models. Practical examples of different unit processes such as chemical reactors and heat exchangers. Modelling of large-scale processes.

**Mode of delivery:**

Negotiable (the course can be taken in English with some special arrangements - contact the responsible person).

**Learning activities and teaching methods:**

Solving exercise problems; textbook.

**Target group:**

Exchange and other international students (for the English version).

**Prerequisites and co-requisites:**

No course requirements.

**Recommended optional programme components:**

The course forms a basis to the advanced courses in the field of control engineering.

**Recommended or required reading:**

Lecture handout and other material distributed at the lecture.

Recommended for supplementary literature: Luyben, W.L.: Process Modeling, Simulation and Control for Chemical Engineers. McGraw-Hill cop., New York 1990, 725 p.

**Assessment methods and criteria:**

Homework and written/oral test

**Grading:**The course unit utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail. Read more about [assessment criteria](#) at the University of Oulu webpage.**Person responsible:**

Aki Sorsa

**Working life cooperation:**

No

**492300A: Rock mechanics, 5 op**

**Voimassaolo:** 01.08.2016 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu Mining School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Zongxian Zhang

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

5 ECTS cr /133 hours of work

**Language of instruction:**

English

**Timing:**

Spring, period 3

**Learning outcomes:**

Upon completion of the course students should: (1) know the basic properties of rock; (2) be able to make stress or strain analysis to a rock sample and a rock structure; (3) be able to analyse rock failure under compression, shear and tension loads; (4) know which factors influence rock failure or fracture and know how those affect rock fracture; (5) know the basic principles and methods in rock support; (6) be able to do rock support design; (7) be able to apply rock mechanics theory to tunnelling, mining planning, rock drilling, rock excavation, slope engineering, and other rock-related engineering.

**Contents:**

The course will: (1) introduce basic properties and characteristics of rock and rock mass; (2) introduce stress analysis method; (3) present basic theory on rock failure or fracture; (4) introduce basic methods for measuring rock strengths (compressive, shear and tensile) in laboratory; (5) present methods for measuring in-situ stresses; (6) introduce methods for rock support; (7) give knowledge on how to apply rock mechanics to mining engineering and other types of rock engineering.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

Lectures, seminars, written reports, and assignments (mine visit if available).

**Target group:**

Students from mining and mineral processing, geophysics and geology

**Recommended or required reading:**

Brady BHG and Brown ET. Rock Mechanics for underground mining, third edition. New York: Kluwer Academic Publishers, 2004.

Goodman RE. Introduction to rock mechanics, second edition. New York: John Wiley & Sons, 1989.

Zhang ZX. Rock fracture and blasting: theory and applications. Oxford: Elsevier, 2016 (Chapters 1, 3-7, 10, 17-19, 21-24).

**Assessment methods and criteria:**

Assessment methods include oral presentations, written reports, seminars, assignments and written examination. The total points gained from the above determine the final grade of the course, and it is given on the scale Fail-1-5.

- For grade 1, the student must be able to know and understand the basic knowledge in this course.
- For grade 2, the student must know how to make stress analysis and rock failure analysis.
- For grade 3 the student must be able to make a plan for rock support.
- For grade 4, the student must be able to make a plan for rock support and evaluate such a plan.
- For grade 5, the student must be able to apply the acquired knowledge to make a very good plan for mining and rock engineering operation by using rock mechanics. He or she must do an outstanding design in at least one aspect, e.g. he/she can find a problem related rock mechanics or rock fracture and know how to solve the problem or how to make improvement.

**Grading:**

The course unit utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Zongxian Zhang

## 461102A: Statics, 5 op

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Mechanical Engineering

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Lahtinen, Hannu Tapio

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay461102A	Statics (OPEN UNI)	5.0 op
461016A-01	Statics, examination	0.0 op
461016A-02	Statics, exercises	0.0 op
461016A	Statics	5.0 op

**ECTS Credits:**

5 ETCS / 149 hours of work

**Language of instruction:**

Lectures in Finnish, foreign students follow the course by reading independently the books in English and taking part to the exercises and exams where all material is given in English.

**Timing:**

The course is held in the autumn semester, during periods 1 and 2. It is recommended to complete the course at the 1st autumn semester.

**Learning outcomes:**

After the course, the student can calculate forces and moments of loaded structures using equations of vector algebra and trigonometry. He/she can draw a free body diagram of the force system and then solve the unknown forces by using equations of equilibrium. He/she can determine resultants from uniformly distributed loads and apply Coulomb's law of friction in the problem equilibrium. The student can solve problems of internal and external forces of particle systems and rigid body systems in case of static equilibrium. Especially, he/she can draw shear force and bending moment diagrams for beam structures.

**Contents:**

Fundamental laws and concepts in statics. Force systems and their treatment. Equilibrium of particles and rigid bodies. Static forces in isostatic structures such as beams, frames, cables and trusses. Friction.

**Mode of delivery:**

Implemented as Face-to-face -teaching.

**Learning activities and teaching methods:**

Lectures 55 h / exercises 42 h / independent work of solving homework problems 52 h.

**Target group:**

Compulsory for candidate degree students of mechanical engineering programme.

**Prerequisites and co-requisites:**

Now prerequisites required.

**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:**

Salmi, T.: Statiikka, Pressus Oy, Tampere 2005; Beer, F., Johnston, R.: Vector Mechanics for Engineers, Statics, McGraw-Hill Book Company, 1996.

**Assessment methods and criteria:**

In the course acceptable homework and midterm exams / final exam are required. This course utilizes continuous assessment. There are four midterm exams, of which the last one is at the same time a final exam. Homework contain every week three problems that are marked. The student is allowed to participate to a final exam, when the homework is accepted.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

University teacher Hannu Lahtinen

**Other information:**

The course gives ability for understanding static equilibrium, ability for determining force balance in structures and readiness for later studies.

**ay461102A: Statics (OPEN UNI), 5 op**

**Voimassaolo:** 01.08.2019 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

461102A	Statics	5.0 op
461016A-02	Statics, exercises	0.0 op
461016A-01	Statics, examination	0.0 op
461016A	Statics	5.0 op

**ECTS Credits:**

5 ETCS / 149 hours of work

**Language of instruction:**

Lectures in Finnish, foreign students follow the course by reading independently the books in English and taking part to the exercises and exams where all material is given in English.

**Timing:**

The course is held in the autumn semester, during periods 1 and 2. It is recommended to complete the course at the 1st autumn semester.

**Learning outcomes:**

After the course, the student can calculate forces and moments of loaded structures using equations of vector algebra and trigonometry. He/she can draw a free body diagram of the force system and then solve the unknown forces by using equations of equilibrium. He/she can determine resultants from uniformly distributed loads and apply Coulomb's law of friction in the problem equilibrium. The student can solve problems of internal and external forces of particle systems and rigid body systems in case of static equilibrium. Especially, he/she can draw shear force and bending moment diagrams for beam structures.

**Contents:**

Fundamental laws and concepts in statics. Force systems and their treatment. Equilibrium of particles and rigid bodies. Static forces in isostatic structures such as beams, frames, cables and trusses. Friction.

**Mode of delivery:**

Implemented as Face-to-face -teaching.

**Learning activities and teaching methods:**

Lectures 55 h / exercises 42 h / independent work of solving homework problems 52 h.

**Target group:**

Compulsory for candidate degree students of mechanical engineering programme.

**Prerequisites and co-requisites:**

Now prerequisites required.

**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:**

Salmi, T.: Statiikka, Pressus Oy, Tampere 2005; Beer, F., Johnston, R.: Vector Mechanics for Engineers, Statics, McGraw-Hill Book Company, 1996.

**Assessment methods and criteria:**

In the course acceptable homework and midterm exams / final exam are required. This course utilizes continuous assessment. There are four midterm exams, of which the last one is at the same time a final exam. Homework contain every week three problems that are marked. The student is allowed to participate to a final exam, when the homework is accepted.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

University teacher Hannu Lahtinen

**Other information:**

The course gives ability for understanding static equilibrium, ability for determining force balance in structures and readiness for later studies.

**455511P: Visual Arts I, 5 op**

**Voimassaolo:** 01.08.2005 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu School of Architecture

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay455511P Visual Arts I (OPEN UNI) 5.0 op

**ECTS Credits:**

5

**Language of instruction:**

Finnish

**Timing:**

Autumn term 1-2

**Learning outcomes:**

To deal with different aspects of visual expression, to expand general knowledge relative to the various fields of art and to develop independent creative expression.

After completing the course the student is able to comprehend various sides of visual expression and can implement these skills in exercise work.

**Contents:**

Object and spatial drawing, classical model drawing, designing and modelling.

**Mode of delivery:**

Contact teaching and independent studying.

**Learning activities and teaching methods:**

lectures and/ or contact teaching 6 hours and contact teaching and/ or group guidance 92hours.

**Target group:**

1.nd year students.

**Prerequisites and co-requisites:**

-

**Recommended or required reading:**

Supplemental reading list will be supplied during the course.

**Assessment methods and criteria:**

Based on exercises.

**Grading:**

1-5

**Person responsible:**

Prof. Matti Sanaksenaho.

**Working life cooperation:**

Students are initiated in the artist's work through guidance of a professional artist.

## 455512P: Visual Arts II, 3 op

**Voimassaolo:** 01.08.2005 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu School of Architecture

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay455512P Visual Arts II (OPEN UNI) 3.0 op

**ECTS Credits:**

3

**Language of instruction:**

Finnish

**Timing:**

Spring term 1-2

**Learning outcomes:**

To deal with different aspects of visual expression, to expand general knowledge relative to the various fields of art and to develop independent creative expression.

After completing the course the student is able to comprehend various sides of visual expression and can implement these skills in exercise work.

**Contents:**

Classical model drawing and various applications of composition and colour theory. The relationship between architecture and colour as well as art and space is studied during the course.

**Mode of delivery:**

Contact teaching and independent studying.

**Learning activities and teaching methods:**

lectures and/ or contact teaching hours and contact teaching and/ or group guidance 92 hours

**Target group:**

2.nd year students

**Prerequisites and co-requisites:**

-

**Recommended or required reading:**

Supplemental reading list will be supplied during the course.

**Assessment methods and criteria:**

Based on exercises.

**Grading:**

1-5

**Person responsible:**

Prof. Matti Sanaksenaho.

**Working life cooperation:**

Students are initiated in the artist's work through guidance of a professional artist.