Opasraportti

FTech - Civil Engineering (2019 - 2020)

Tutkintorakenteet

Master of Science (Tech), Civil Engineering 2019

Tutkintorakenteen tila: published

Lukuvuosi: 2019-20

Lukuvuoden alkamispäivämäärä: 01.08.2019

Bridge studies (0 - 60 op)

If you have bridge studies in your PSP, please fill them here.

Module of the Options (55 - 60 op)

Choose one of module of the option.

Geo Engineering

A485221: Module of the Option / Geo Engineering, 60 op
Compulsory
488110S: Water and Wastewater Treatment, 5 op
485304S: Fundamentals of Civil Engineering, 5 op
488129S: Foundation Engineering, 5 op
488127S: Field measurements, site investigations and geotechnical tests, 5 op
488128S: Laboratory tests in water resources engineering, 5 op
485306S: Geoenvironmental Engineering, 5 op
488144A: Water distribution and sewage networks, 5 op
488134S: Hydrogeology and groundwater engineering, 5 op
485305S: Modelling in Geoenvironmental Engineering, 5 op
485401A: Basics of Traffic Engineering, 5 op
488141S: Urban hydrology, 5 op
485404S: Road Design and Construction, 5 op

Structural Engineering and Construction Technology

A485222: Module of the Option/Structural Engineering and Construction Technology, 60 op
Compolsory
466111S: Building physics, 5 op
466109S: Concrete technology, 5 op
466107S: Design of concrete structures, 6 op
466105S: Design of Steel Structures, 6 op
466117S: Structural renovation of buildings, 5 op

466114S: Building information modeling, 5 op
485021A: Construction Contracting, 5 op
488129S: Foundation Engineering, 5 op
485002S: Advanced Practical Training, 5 op

Choose at least 25 ECTS

466110S: Advanced topics on concrete technology, 5 op
466108S: Advanced topics on design of concrete structures, 6 op
466106S: Advanced topics on design of steel structures, 6 op
466112S: Advanced topics on building physics, 5 op
466118S: Advanced topics on structural engineering and construction technology, 5 - 10 op
485304S: Fundamentals of Civil Engineering, 5 op
485305S: Modelling in Geoenvironmental Engineering, 5 op
485306S: Geoenvironmental Engineering, 5 op
488127S: Field measurements, site investigations and geotechnical tests, 5 op
485401A: Basics of Traffic Engineering, 5 op
485402S: Advanced Course in Traffic Engineering, 5 op
485403A: Basics of Road Engineering, 5 op
485404S: Road Design and Construction, 5 op
466116S: Information modelling and automation in building construction and maintenance, 2,5 - 5 op
466115S: Information modelling and automation in intrastructure construction and maintenance, 5 op

Supplementary Modules (25 - 45 op)

You can choose courses free in this MOdule or choose at least one of Supplementary Modules. Insert enough studies to Degree (90 ECTS+Master's Thesis).

Practical Training

485002S: Advanced Practical Training, 5 op

Water and Geo Engineering

A485246: Supplementary Module / Geo Engineering, 30 op

Free choice courses

461102A: Statics, 5 op
461103A: Strength of materials I, 5 op
466101A: Introduction to building construction, 5 op
466102A: Introduction to structural design, 3 - 5 op
488123S: River Engineering and Hydraulic Structures, 5 op
488139S: Surface water quality modelling, 5 op
492300A: Rock mechanics, 5 op
485403A: Basics of Road Engineering, 5 op
485402S: Advanced Course in Traffic Engineering, 5 op

Structural Engineering and Construction Technology

A460256: Supplementary Module/Structural Engineering and Construction Technology, 25 op

Ch

466106S: Advanced topics on design of steel structures, 6 op
466108S: Advanced topics on design of concrete structures, 6 op
466110S: Advanced topics on concrete technology, 5 op
466112S: Advanced topics on building physics, 5 op
466115S: Information modelling and automation in intrastructure construction and maintenance, 5 op
466116S: Information modelling and automation in building construction and maintenance, 2,5 - 5 op
466118S: Advanced topics on structural engineering and construction technology, 5 - 10 op
488127S: Field measurements, site investigations and geotechnical tests, 5 op
485401A: Basics of Traffic Engineering, 5 op
485402S: Advanced Course in Traffic Engineering, 5 op
485403A: Basics of Road Engineering, 5 op
485404S: Road Design and Construction, 5 op
485304S: Fundamentals of Civil Engineering, 5 op

Free choice courses

Master's Thesis (30 op)

-

485991S: Master's Thesis Seminar, 0 op
485999S: Master's Thesis in Civil Engineering, 30 op
485990S: Maturity Test, Civil Engineering, 0 op

Bachelor of Science (Tech), Process and Environmental Engineering

Tutkintorakenteen tila: archived

Lukuvuosi: 2019-20

Lukuvuoden alkamispäivämäärä: 01.08.2019

Basic Studies (70 op)

-

A485120: Civil Engineering, Basic Studies, 70 op
- *Basic Studies*
  - 485000P: Planning of Studies and Career, 1 op
  - 031010P: Calculus I, 5 op
  - 031075P: Calculus II, 5 op
  - 031076P: Differential Equations, 5 op
  - 031021P: Probability and Mathematical Statistics, 5 op
  - 031078P: Matrix Algebra, 5 op
  - 780120P: Basic Principles in Chemistry, 5 op
  - 761119P: Electromagnetism 1, 5 op
  - 461102A: Statics, 5 op
  - 461103A: Strength of materials I, 5 op
  - 555265P: Occupational Safety and Health Management, 5 op
  - 485021A: Construction Contracting, 5 op
  - 555285A: Project management, 5 op
  - 030005P: Information Skills, 1 op
- *Choose language studies*
  - 902150Y: Professional English for Technology, 2 op
  - 902142Y: Business Correspondence, 2 op
  - 902145Y: Working Life Skills, 2 op
  - 902147Y: Academic Vocabulary for Science and Technology, 2 op
  - 902121Y: Other Studies in English (level B2), 2 - 8 op
- *Choose your mother tongue*
  - 901044Y: Second Official Language (Swedish), Written Skills, 1 op
  - 901045Y: Second Official Language (Swedish), Oral Skills, 1 op
  - 900081Y: Second Official Language (Finnish), Written Skills, 1 - 2 op
  - 900082Y: Second Official Language (Finnish), Oral Skills, 1 - 3 op

Intermediate Studies (60 op)

A485124: Civil Engineering, Intermediate Studies, 60 op
- *Intermediate Studies*
  - 485101A: Introduction to building construction, 5 op
  - 461105A: Technical thermodynamics, 5 op
  - 485103A: Building physics, 5 op
  - 485022A: Fundamentals of built environment, 5 op

485301A: Basics of Geotechnics, 5 op
485302A: Foundation Engineering, 5 op
485201A: Building information modeling and CAD, 5 op
485023A: GIs and geoinformatics, 5 op
485102A: Introduction to structural design, 5 op
485105A: Concrete technology, 5 op
485106A: Design of concrete structures, 5 op
485001A: Practical Training, 5 op

Module preparing for the Option (40 op)

Choose on for your Study Option.

Geo Engineering

A485121: Civil Engineering, Module preparing for the Option / Geo Engineering, 40 op
Geo Engineering
477052A: Fluid Mechanics, 5 op
488102A: Hydrological Processes, 5 op
488144A: Water distribution and sewage networks, 5 op
492300A: Rock mechanics, 5 op
485401A: Basics of Traffic Engineering, 5 op
485403A: Basics of Road Engineering, 5 op
488505A: Waste managemet and recycling, 5 op
485303A: Soil Mechanics, 5 op

Structural Engineering

A485122: Civil Engineering, Module preparing for the Option / Structural Engineering, 40 op
Structural Engineering
461104A: Strength of materials II, 5 op
461106A: Dynamics, 5 op
461108A: Mechanics of materials, 5 op
461107A: Finite Element Methods I, 5 op
485107A: Timber construction and product technology, 5 op
485110A: Timber product technology and construction, 5 op
485108A: Desing of Steel Structures and Steel Construction, 5 op
485104A: Structural renovation of buildings, 5 op

Mining Engineering

A485123: Civil Engineering, Module preparing for the Option / Mining Engineering, 40 op
Mining Engineering
771113P: Introduction to Geology I, 5 op
771114P: Introduction to Geology II, 5 op
771117P: Basic course in mineralogy, 5 op
461011A: Strength of Materials II, 7 op
461106A: Dynamics, 5 op
461108A: Mechanics of materials, 5 op
491102P: Introduction to solid earth geophysics, 5 op
492300A: Rock mechanics, 5 op

Bachelor's Thesis (10 op)

485980A: Bachelor's Thesis, 8 op
900060A: Technical Communication, 2 op
485981A: The Maturity Test for Bachelor's Degree, 0 op

Tutkintorakenteisiin kuulumattomat opintokokonaisuudet ja -jaksot

485109A: Numerical methods in structural engineering, 5 op
460004S: Practical Training II, 5 op

Opintojaksojen kuvaukset

Tutkintorakenteisiin kuuluvien opintokohteiden kuvaukset

A485221: Module of the Option / Geo Engineering, 60 op

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Module of the Option
Laji: Study module
Vastuuyksikkö: Civil Engineering field
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

Compulsory

488110S: Water and Wastewater Treatment, 5 op

Voimassaolo: 01.08.2005 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Field of Process and Environmental Engineering
Arvostelu: 1 - 5, pass, fail
Opettajat: Elisangela Heiderscheidt
Opintokohteen kielet: English
Leikkaavuudet:

480151S	Water and Wastewater Treatment	7.0 op
480208S	Industrial Water and Wastewater Treatment	3.5 op

ECTS Credits:
5 ECTS credits/133 hours of work
Language of instruction:
English
Timing:
The course unit is held in the autumn semester, during period 1
Learning outcomes:
Upon completion of the course, the student will be able to understand the theory and practicalities behind the most used purification processes in water and wastewater treatment. The student will also be capable of performing basic dimensioning calculations and therefore he/she will be able

to dimension structures/units of water and wastewater treatment plants and to comprehend the basic requirements of different purification processes.

Contents:

Water quality characteristics of source water; basic principles of purification processes (coagulation/flocculation, sedimentation, biological treatment, filtration, disinfection, etc); process units in water and waste water treatment; selection of process units; dimensioning of treatment structures and unit processes.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures (30 h), field visits (5 h), exercises and other assignments (60) and self-study (38 h).

Target group:

Students in Master program of Environmental Engineering and in master program of civil engineering.

Prerequisites and co-requisites:

The required prerequisite is the completion of the following course or to have corresponding knowledge prior to enrolling for the course unit: Introduction to process and environmental engineering (477013P) or I (477011P) and II (488010P)

Recommended optional programme components:

-

Recommended or required reading:

To be provided during the course.

Assessment methods and criteria:

The course can be completed in two different study modes: A) Active mode: midterm exam based on reading material + completion of 2 group exercises + final exam based on lectures and exercises; B) Passive mode (book exam): 100% self-study mode where the student is provided with 2-3 reference books and attends an exam based on the provided material. (Passive mode can be complete under special circunstances)
Read more about assessment criteria at the University of Oulu webpage.

Grading:

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

Person responsible:

Post-doctoral researcher Dr Elisangela Heiderscheidt

Working life cooperation:

Through visits to water and wastewater treatment plants, which include lectures provided by environmental engineers in charge and guided tours, the students familiarize with the main technological and process related principles of the field and have the chance to experience in first hand how to deal with some of the most common issues related to water and wastewater purification systems.

Other information:

-

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

ECTS Credits:

5 ECTS credits/133 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 how to calculate stability and settlement of municipal earth structures, design the structures against frost depth and frost heave and evaluate the needs for soil improvement. The student knows risks of the excavations and slopes and can design those using mathematical theories.

Contents:

Norms and instructions, basis of geotechnical design, earth and road structures, properties of soil material and industrial by-products, soil improvement, excavations, Property and surface drainage, lowering of groundwater table. Pipeline Construction. Specialities of railway construction and vibration problems.

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 Water and Geo Engineering study option of the Environmental Engineering program

Prerequisites and co-requisites:

Prerequisites: 488115A Geomechanics, 477032A AutoCAD and Matlab in process and environmental engineering (or similar AutoCAD knowledge)

Recommended optional programme components:

-

Recommended or required reading:

Handout and other materials delivered in lectures

Assessment methods and criteria:

Examination and homeworks
Read more about assessment criteria at the University of Oulu webpage.

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.

488129S: Foundation Engineering, 5 op

Voimassaolo: 28.11.2016 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Process and Environmental Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Tuomela, Anne Marika

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay485302A	Foundation Engineering (OPEN UNI)	5.0 op

ECTS Credits:

5 ECTS credits/133 hours of work

Language of instruction:

5 ECTS credits / 132 hours of work

Timing:

The course unit is held in the autumn semester during period 2
Course 485302A replaces this course in academic year 2020-2021.

Learning outcomes:

After completing the course, students can choose the right foundation type and design shallow and deep foundations. After completing the course the student is also able to design earth retaining structures, drainage and frost protection.

Contents:

The following topics are covered during the course: The basis of geotechnical and structural design of foundations. Foundation types and foundation construction. Piles and piled foundations. Ground bearing slabs. Gravity and embedded walls. Ground improvement. Drainage. Frost protection.

Mode of delivery:

Lecture room teaching.

Learning activities and teaching methods:

Lectures and exercises

Target group:

Master's students of environmental and civil engineering

Prerequisites and co-requisites:

Recommend course 488115A Geomechanics

Recommended or required reading:

1. Lecture material.
2. RIL 254-2016, Paalutusohje
3. RIL 263-2014 Kaivanto-ohje
4. Decoding Eurocode 7 (2008), Bond, A. and Harris, A., Taylor & Francis, (Contents are informed during lectures).

Assessment methods and criteria:

Passed practical works and exam

Grading:

Rating scale 1-5

Person responsible:

Anne Tuomela

488127S: Field measurements, site investigations and geotechnical tests, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Process and Environmental Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Ali Torabi Haghighi

Opintokohteen kielet: English

Leikkaavuudet:

488118S	Laboratory Exercises and Field Measurements in Environmental Engineering	10.0 op

ECTS Credits:

5 ECTS /133 hours of work

Language of instruction:

English

Timing:

The course unit is given during periods 1 and 2

Learning outcomes:

Upon completion the student should be able to design field measurements and understand the quality of sampling and measurements in the field of environmental engineering. The student also improves skills of working in a team of fellow students to share expertise and execution responsibilities. The student understands the laboratory testing procedures and the associated parameters that help in estimating the soil mechanics and Geotechnical engineering and. The student knows how to use different methods for field measurement and sampling in water and geotechnical issues. The student can take considering the safety during the laboratory works and field measurements. After the course, the student can write detailed engineering reports.

Contents:

In the lectures: Units of measurements, error and mistake in laboratory works and field measurements, random and systematic error, precision and accuracy in laboratory work, planning field works, description of measuring site, securing results and material, sample preservation, subsoil exploration, direct & indirect methods of exploration, disturb and undisturbed samples, safety in field work, introduction on surveying, levelling, map and scale, different tests in soil mechanics laboratory.
Laboratory works in soil mechanics and geotechnical engineering: sieving test, hydrometer test, Atterberg limits test, proctor test, direct shear box test and oedometer test.
In the field: Working with GPS. Levelling and collecting data for preparing topography map. Soil sampling, surface water and groundwater sampling, Measuring velocity and discharge of river by using current meter and tracer.

Mode of delivery:

Face-to-face teaching, laboratory working

Learning activities and teaching methods:

Lectures (16 h), Fieldwork (20 h), Lab-work (9 h), Group work (88 h)

Target group:

Master students in the Water and Geo Engineering and Water and Environment study options

Prerequisites and co-requisites:

The required prerequisite is the completion of the following course prior to enrolling for the course unit: 488115A Geomechanics

Recommended optional programme components:

-

Recommended or required reading:

Field measurements and Laboratory work instruction, lecture materials

Assessment methods and criteria:

Two exams (40%), Report (50%) and assignments (10%), passing the exam is requirement for passing the course

Grading:

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

Person responsible:

University Teacher Ali Torabi Haghighi

Working life cooperation:

No

Other information:

-

488128S: Laboratory tests in water resources engineering, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Process and Environmental Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Ali Torabi Haghighi

Opintokohteen kielet: English

Leikkaavuudet:

488118S Laboratory Exercises and Field Measurements in Environmental Engineering 10.0 op

ECTS Credits:

5 ECTS /133 hours of work

Language of instruction:

English

Timing:

The course unit is given during the spring periods 3 and 4

Learning outcomes:

Upon completion this course, the student improves their skills of working in a team of fellow students to share expertise and execution responsibilities. The student understands the laboratory testing procedures and the associated parameters that help in estimating the water, and waste water properties. The laboratory work contains 3 main parts: fluid mechanics and open channel, water and waste water and ground water engineering.

Contents:

In the lectures: Units of measurements, error and mistake in laboratory works, how to write lab report, safety in laboratory, calibration, introduction to laboratory test in fluid mechanics and open channel hydraulics, introduction to laboratory tests in water and waste water engineering and introduction to groundwater engineering.
In laboratory: Laboratory works on Fluid mechanics and open channel hydraulics contain different method for discharge measurement, Bernoulli equation, Momentum equation, reservoir outflow, Pump and pumping, gates and wires, hydraulic jump and tracer test. Laboratory works on Ground water engineering contain hydraulic conductivity (K), specific yield (S), porosity (n) and PF curve test, Darcy low and groundwater flow, contaminant transport. Laboratory works on water and waste water engineering contain Jar test experiment, settling velocity, limestone ($CaCO_3$) filtration, aeration determination of Fe, Cl^-, Mn.

Mode of delivery:

Face-to-face teaching, laboratory working

Learning activities and teaching methods:

Lectures (10 h), Lab-work (30 h), Group work (93 h)

Target group:

Master students in the Water and Geo Engineering and Water and Environment study options

Prerequisites and co-requisites:

The required prerequisite is the completion of the following courses prior to enrolling for the course unit: 488102 Hydrological Processes, 488108S Groundwater Engineering, 488110S Water and Wastewater Treatment, 488113S Introduction to Surface Water Quality Modelling

Recommended optional programme components:

-

Recommended or required reading:

Field measurements and Laboratory work instruction, lecture materials

Assessment methods and criteria:

Each exercise is evaluated graded on the scale 1-5. The final grade of the course is weighted average of following parts participate in the lectures (5%), participate in the laboratory (20% if the respective report will be presented), assignments (10%), and reports (50%), Exam (15%).

Grading:

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

Person responsible:

University Teacher Ali Torabi Haghighi

Other information:

-

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/133 hours of work

Language of instruction:

Finnish and option complete in English

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 know how to used by-products from industry in different applications.

Contents:

Norms and instructions, there will be a project work where student will be discover a contaminated soil and a proposal remediation technique, Properties of soil material and industrial by-products, basis of geotechnical design to landfill environment, Structures of dams and inpoundments, Challenges of mining, Remote sensing as a part of geotechnical 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 study option of Water and Geo Engineering

Prerequisites and co-requisites:

488115A Geomechanics

Recommended optional programme components:

-

Recommended or required reading:

Handout and other materials delivered in lectures

Assessment methods and criteria:

Written exam and exercises
Read more about assessment criteria at the University of Oulu webpage.

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 the Rusko waste center and also guest lectures from professionals in industry and administration.

Other information:

This course will replace course 488131S Geoenvironmental Engineering in Academic year 2019-20.

488144A: Water distribution and sewage networks, 5 op

Voimassaolo: 01.08.2019 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Process and Environmental Engineering

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Leikkaavuudet:

488135S Water distribution and sewage networks 5.0 op

ECTS Credits:

5 ECTS credits/133 hours of work

Language of instruction:

English

Timing:

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

Learning outcomes:

Student knows and understands the systems and dynamics needed for water distribution and waste water networks. Student is able to do basic dimensioning for water distribution network and sewer system of an urban area.

Contents:

Water distribution and waste water network design and dimensioning, Pumping and storage tanks needed in distribution of water and collection of sewage waters, renovation of pipelines, special circumstances in water distribution, effects of cold climate and harmful hydraulic conditions.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures (30 h), homework (45 h) and a design exercise (58 h).

Target group:

Students in master program of environmental engineering and in master program of civil engineering.

Prerequisites and co-requisites:

Use of AutoCAD-program

Recommended optional programme components:

The recommended prerequisite is the completion of the following course prior to enrolling for the course unit: 477052A Virtaustekniikka, 477312A Lämmön- ja aineensiirto 488102A Hydrological Processes and 488051A AutoCAD ja Matlab prosessi- ja ympäristötekniikan työkaluna or at least equivalent information about water management.

Recommended or required reading:

Lecture handout and other materials delivered in lectures. To the appropriate extent: RIL 237-1-2010 Vesihuoltoverkkojen suunnittelu, RIL 237-2-2010 Vesihuoltoverkkojen suunnittelu, RIL 124-2 Vesihuolto II, Mays Water distribution systems handbook

Assessment methods and criteria:

Exam and a design exercise.

Grading:

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

Person responsible:

Postdoctoral Researcher Pekka Rossi

Working life cooperation:

Visit to a site of water distribution network buiding site, pumping station or water supply/sewerage company.

Other information:

Replaces the course 488135S.

488134S: Hydrogeology and groundwater engineering, 5 op

Voimassaolo: 28.11.2016 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Field of Process and Environmental Engineering
Arvostelu: 1 - 5, pass, fail
Opettajat: Pekka Rossi
Opintokohteen kielet: English

ECTS Credits:

5 ECTS credits/133 hours of work

Language of instruction:

English

Timing:

The course unit is held in the spring semester, during period 3

Learning outcomes:

Upon completion of the course, the student will have knowledge on groundwater systems and the basic hydrogeological and engineering concepts involved. This includes analysis of flow in porous media, hydraulics of groundwater systems, groundwater quality and groundwater use. After the course students are able to estimate key factors influencing on groundwater recharge, flow and discharge and to use general methods to calculate groundwater flow.

Contents:

2D and 3D groundwater flow, conceptual models, unsaturated layer flow, water storage and retention, heterogeneity and isotropy, aquifer types, pumping tests, geophysical methods, groundwater quality and resources in Finland

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

lectures (18 h), calculus lectures (12 h), homework, exercises and self-study (103 h).

Target group:

Master students in the water engineering orientation of the Environmental Engineering program and in master program of civil engineering

Prerequisites and co-requisites:

The required prerequisite is the completion of the following course prior to enrolling for the course unit: 488102A Hydrological Processes

Recommended or required reading:

Lecture handouts, Physical and Chemical Hydrogeology (Domenico PA, Schwartz FW, 2nd edition, 1998, ISBN 0-471- 59762-7). Maanalaiset vedet - pohjavesigeologi-an perusteet (Korkka-Niemi K, Salonen V-P, 1996, ISBN 951-29-0825-5). Pohjavesi ja pohjaveden ympäristö (Mälkki E, 1999, ISBN 951-26-4515-7).

Assessment methods and criteria:

exam and/or lecture exams.

Grading:

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

Person responsible:

Postdoctoral Researcher Pekka Rossi

Working life cooperation:

Students familiarize themselves to a real groundwater aquifer cases discussed in lectures and in the course exercise.

485305S: Modelling in 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:

488111S Modelling in Geoenvironmental Engineering 5.0 op

ECTS Credits:

5 ECTS credits/133 hours of work

Language of instruction:

Finnish

Timing:

The course unit is held in the spring semester, during period 4

Learning outcomes:

After the course the student can apply the numerical calculation methods in design and dimensioning of earth and geoenvironmental structures. The student can evaluate the influence of boundary conditions and material parameters in calculation results.

Contents:

Contaminant transport. Design and dimensioning of piles, tailings and dams structures. Settlement calculation due to different load types. Calculating the earth pressure of retaining walls. Freezing and thawing of earth structures. Geotechnical design of pile foundation.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures (10 h), design (58 h) and modelling assignments (65 h).

Target group:

Master’s students in the study option of Water and Geoenvironmental Engineering

Prerequisites and co-requisites:

The required prerequisite: 488115A Geomechanics. Also recommended: 488051A AutoCAD and Matlab in Process and Environmental Engineering, 488121S Fundamentals of Civil Engineering, 488129S Foundation Engineering, 488131S Geoenvironmental Engineering.

Recommended optional programme components:

-

Recommended or required reading:

Lecture handout and other materials delivered in lectures

Assessment methods and criteria:

Passing the course requires solving the given assignments and writing reports about them. The assignments are solved with computer modelling, which requires constant participation to the lectures.

Grading:

The course utilizes verbal grading scale pass/fail.

Person responsible:

University teacher Anne Tuomela

Working life cooperation:

The course includes guest lectures from an international consulting and engineering company.

Other information:

This course will replace course 488111S Modelling in Geoenvironmental Engineering in Academic year 2019-20.

485401A: Basics of Traffic Engineering, 5 op

Voimassaolo: 01.08.2019 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Civil Engineering field

Arvostelu: 1 - 5, pass, fail

Opettajat: Virve Merisalo

Opintokohteen kielet: Finnish

Leikkaavuudet:

488151A	Basics of Traffic Engineering	5.0 op

ECTS Credits:

5 ECTS / 133 h of work

Language of instruction:

Finnish

Timing:

Period 1

Learning outcomes:

By completing the course the student knows the basics of modes of transport, the significance of traffic and transportation to society, traffic planning and research methods, transport economics and the external effects of transport.

Contents:

Modes of transport, Need for traffic and transportation, Transport planning and research, Economical and environmental impacts of traffic, Traffic safety.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 28 h, exercises 22 h, self-study 85 h

Target group:

Students in the Master's Programmes of environmental engineering and mechanical engineering

Prerequisites and co-requisites:

-

Recommended optional programme components:

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

Recommended or required reading:

Materials delivered during the lectures

Assessment methods and criteria:

Examination 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 Virve Merisalo

Working life cooperation:

No

Other information:

This course will replace course 488151A Basics of Traffic Engineering in Academic year 2019-20.

488141S: Urban hydrology, 5 op

Voimassaolo: 28.11.2016 - 31.07.2020

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Process and Environmental Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Pekka Rossi

Opintokohteen kielet: English

Leikkaavuudet:

488146S	Urban water management	5.0 op

ECTS Credits:

5 ECTS credits/133 hours of work

Language of instruction:

English

Timing:

The course unit is held in the spring semester, in period 3

Learning outcomes:

Student has a knowledge on the different aspects of urban hydrology to manage waters in a built environment. Student understands the challenges concerning quantity and quality questions of urban waters and can take them into account in designing.

Contents:

Storm water system design, green infrastructure, urban erosion, drainage, flood control and climate change in urban hydrology, urban water quality and constructed wetlands.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures (30 h), homeworks (45 h) and a design exercise (58 h).

Target group:

Students in master program of environmental engineering and in master program of civil engineering

Prerequisites and co-requisites:

Use of AutoCAD-programs. This course is a straight continuation of course 488135A Water distribution and sewage networks (recommended but not prerequisite prior to this course).

Recommended optional programme components:

The recommended prerequisite is the completion of the following course prior to enrolling for the course unit: 477052A Fluid mechanics, 477312A Lämmön- ja aineensiirto 488102A Hydrological Processes and 488051A AutoCAD ja Matlab prosessi- ja ympäristötekniikan työkaluna or at least equivalent information about water management.

Recommended or required reading:

Lecture handouts, Hulevesiopas (2012, in Finnish)

Assessment methods and criteria:

Examination, seminar and a design exercise.

Grading:

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

Person responsible:

Postdoctoral Researcher Pekka Rossi

Working life cooperation:

Course includes guest lectures of storm water designers/consultants and/or municipalities/cities responsible for the storm water management.

485404S: Road Design and Construction, 5 op

Voimassaolo: 01.08.2019 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Civil Engineering field
Arvostelu: 1 - 5, pass, fail
Opettajat: Veikko Pekkala
Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS / 133 h of work

Language of instruction:

Finnish

Timing:

Period 4

Learning outcomes:

By completing the course the student is familiar with road structure and function, structural modernisation, pavements and the basics of earthworks. He/she is also able to design road computer aided.

Contents:

Function of road structure, road damaging, structural modernisation, pavements, Road design and construction

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 28 h, exercises 32 h, self-study 75 h

Target group:

Students in the master's programmes of environmental engineering and mechanical engineering

Prerequisites and co-requisites:

488153A Road Design and Construction, and 488051A AutoCAD and Matlab in process and environmental engineering

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:

Materials delivered during the lectures

Assessment methods and criteria:

Examination and exercises

Grading:

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

Person responsible:

Veikko Pekkala

Other information:

This course will replace course 488154S Road Design and Construction in Academic year 2019-20.

A485222: Module of the Option/Structural Engineering and Construction Technology, 60 op

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Module of the Option
Laji: Study module
Vastuuyksikkö: Civil Engineering field
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

Compolsory

466111S: Building physics, 5 op

Voimassaolo: 01.08.2015 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Field of Mechanical Engineering
Arvostelu: 1 - 5, pass, fail
Opettajat: Filip Fedorik
Opintokohteen kielet: English
Leikkaavuudet:

485103A Building physics 5.0 op
460160S-01 Building Physics, examination 0.0 op
460160S-02 Building Physics, exercises 0.0 op
460160S Building Physics 3.5 op

ECTS Credits:

5 ECTS credits / 132 hours of work

Language of instruction:

Englanti

Timing:

Autumn, Periods 1-2
Course 485103A Building Physics replaces this course in academic year 2020-2021.

Learning outcomes:

After completing the course the student can explain basic phenomenon of building physics. The student can analyse and describe heat, air and moisture transfer in buildings and also explain main causes of typical moisture damages. The student can explain factors affecting energy efficiency and can calculate the energy efficiency number. The student knows the calculation methods in acoustics.

Contents:

Thermal isolation design. Determination of structure temperature. Moisture transfer and moisture exiting. Airflows in structures. Energy efficiency in buildings. Acoustic design.

Mode of delivery:

Face-to-face and distance learning

Learning activities and teaching methods:

Lectures, excercises, case studies, and self directed learning

Target group:

Students studying structural engineering

Prerequisites and co-requisites:

466101A Introduction to building construction

Recommended or required reading:

The material that is in English will be distributed at the lectures 1) Lecture notes (mainly in Finnish) 2) Suomen rakentamismääräyskokoelman osat
C1, C2, C3, C4 ja D3. 3) Introduction to Building Physics, Hagentoft, C.-E. (2001), ISBN 91-44-01896-7, (As specified in lectures).

Assessment methods and criteria:

Excercises and exam

Grading:

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

Other information:

This course will replace course 485103A Building physics in Academic year 2020-21.

466109S: Concrete technology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Mechanical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Jorma Hopia

Opintokohteen kielet: Finnish

Leikkaavuudet:

485105A	Concrete technology	5.0 op
460155S-01	Concrete Technology, examination	0.0 op
460155S-02	Concrete Technology, laboratory exercise	0.0 op
460155S	Concrete Technology	4.5 op

ECTS Credits:

5 ECTS credits / 132 hours of work

Language of instruction:

Finnish

Timing:

Spring semester, periods 3-4
Course 485105A replaces this course in academic year 2020-2021.

Learning outcomes:

After completing the course the student is able to specify concrete and the materials from which it is made. They can design normal concrete mixes and identify, describe and carry out the main laboratory tests relevant to the use of concrete on site.

Contents:

Cements and cementitious materials, aggregates for concrete, concrete mix design, properties of fresh and hardened concrete, laboratory tests, specification testing and compliance, environmental exposure classes.

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:

466101A Introduction to building construction

Recommended optional programme components:

466101A Introduction to building construction

Recommended or required reading:

The material that is in English will be distributed at the lectures. Lecture notes (mainly in Finnish), 1) Luennoilla jaettu materiaali 2) Järvinen, Maarit. 2004. Betonitekniikan oppikirja : BY 201. Helsinki : Suomen Betonitieto.; 3) Suomen betoniyhdistys. Betoninormit 2004: BY 50. Helsinki : Suomen betonitieto; 4) Suomen Standardisoimisliitto ry. SFS-Standardisointi: 5) SFS-EN Standards

Assessment methods and criteria:

Passed laboratory excercises and exam

Grading:

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

Person responsible:

Jorma Hopia

Other information:

This course will replace course 485105A in Academic year 2020-21.

466107S: Design of concrete structures, 6 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Mechanical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Antti Niemi

Opintokohteen kielet: Finnish

Leikkaavuudet:

485106A	Design of concrete structures	5.0 op
460147A	Introduction to Design of Concrete Technology	4.0 op
460147A-01	Introduction to Design of Concrete Technology, examination	0.0 op
460147A-02	Introduction to Design of Concrete Technology, exercise work	0.0 op
460148S	Design of Concrete Structures	4.0 op
460148S-01	Design of Concrete Structures I, examination	0.0 op
460148S-02	Design of Concrete Structures I, exercises	0.0 op

ECTS Credits:

6 ECTS /162 hours

Language of instruction:

Finnish

Timing:

Lectures and exercising on periods 3 and 4.
Course 485106A replaces this course in academic year 2020-2021.

Learning outcomes:

Upon completion of the course, the student will be able to design typical reinforced concrete structures to EN-standards.

Contents:

Strength and strain properties of concrete and reinforcing bars, time dependent properties. Limit state design of concrete beams and columns to EN standards. Service life design. Fire design. Anchoring and joints of reinforcing bars. Design of flanged cross sections, walls and wall like beams, and foundations carrying walls and columns.

Mode of delivery:

face-to-face teaching.

Learning activities and teaching methods:

Lectures and exercising 54 hours including personal and team work. Self-reliant studying and homework 108 hours.

Target group:

Master level students focusing on structural engineering and design.

Prerequisites and co-requisites:

Recommended good skills in: Statics, strength of materials, structural mechanics of beam and plated structures. Basics in concrete technology and structural design.

Recommended or required reading:

Nykyri: BY211 Betonirakenteiden suunnittelun oppikirja, osa 1, 2013 ja osa 2, 2015; Leskelä: By210 Betonirakenteiden suunnittelu ja mitoitus 2008; By60 Suunnitteluohje EC2 osat 1-1 ja 1-2, 2008; EN 1992-1-1, EN 1992-1-2 (ja muut EN-standardit tarvittavilta osin); BY51 Betonirakenteiden käyttöikäsuunnittelu 2007; BY47 Betonirakentamisen laatuohjeet 2007; RIL 229-2-2006 Rakennesuunnittelun asiakirjaohje, Mallipiirustukset ja -laskelmat; By47 Betonirakentamisen laatuohjeet 2007; RIL202-2012 Betonirakenteiden suunnitteluohje. Martin, Purkiss: Concrete design to EN 1992, Elsevier, 2nd ed. 2006. Lecture and exercise materials.

Assessment methods and criteria:

Continuous assessment. The course can be completed by participating in intermediate exams during the course, or in final exam. Assessment criteria are based on the learning outcomes of the course.

Grading:

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

Person responsible:

Antti Niemi

Other information:

This course will replace course 485106A in Academic year 2020-21.

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

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 capable of explaining the crystalline structure of steel material and he understands elasto-plastic material model. He is able to explain the effect of inclusions, heat treatment and welding process to the mechanical properties of a steel material. The student is familiar with fire design of steel structures. He is able to explain common types of corrosion. The student is able to design the most typical joints in a steel frame and he can analyze simple steel structures. He is also able to analyze stability problems and explain the effects of imperfections and second order effects on frame behavior and member forces.

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:

Major students in Structural Engineering and Construction Technology, Mashine design, and Engineering Mechancs.

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

466117S: Structural renovation of buildings, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Mechanical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Antti Niemi

Opintokohteen kielet: Finnish

Leikkaavuudet:

485104A Structural renovation of buildings 5.0 op

ECTS Credits:

5 ECTS credits / 132 hours of work

Language of instruction:

Finnish

Timing:

Autumn, Periods 1 and 2
Course 485104A replaces this course in academic year 2020-2021.

Learning outcomes:

After completing the course students can describe different structural materials and structural systems used in residential buildings in 1900-2000. They are able to identify and explain the typical risk structures and defects in those buildings. They can also explain the old design codes and recommendation used in Finland.

Contents:

Finnish house construction and typical details during 1900-2000. Standards, design recommendations and design methods used in Finland.

Mode of delivery:

Lecture room teaching

Learning activities and teaching methods:

Lectures and exercises

Target group:

Students studying structural engineering

Prerequisites and co-requisites:

466101A Introduction to building construction, 466111S Building physics

Recommended or required reading:

Lecture material.

Assessment methods and criteria:

Passed practical works and exam

Grading:

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

Person responsible:

professor Rauno Heikkilä

Other information:

This course will replace course Korjausrakentaminen 485104A in Academic year 2020-21.

466114S: Building information modeling, 5 op

Voimassaolo: 01.08.2015 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Field of Mechanical Engineering
Arvostelu: 1 - 5, pass, fail
Opettajat: Jorma Hopia
Opintokohteen kielet: Finnish
Leikkaavuudet:

485202S Building information modeling 5.0 op
460121S Building information modelling 3.0 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, excercises 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:

Partisipation to lectures and exercises

Grading:

Pass or fail.

Person responsible:

Rauno Heikkilä

485021A: Construction Contracting, 5 op

Voimassaolo: 01.08.2018 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Civil Engineering field
Arvostelu: 1 - 5, pass, fail
Opettajat: Liedes, Hannu Tapani
Opintokohteen kielet: Finnish
Leikkaavuudet:

488119A	Basics of infrastructure planning and development	5.0 op
466113S	Construction economics	5.0 op
460165A-02	Introduction to Construction Economics I, practical work	0.0 op
460165A-01	Introduction to Construction Economics I, examination	0.0 op

ECTS Credits:

5 ECTS

Language of instruction:

Finnish

Person responsible:

Hannu Liedes

Other information:

This Course replaces courses 466113S and 488119A.

488129S: Foundation Engineering, 5 op

Voimassaolo: 28.11.2016 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Process and Environmental Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Tuomela, Anne Marika

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay485302A Foundation Engineering (OPEN UNI) 5.0 op

ECTS Credits:

5 ECTS credits/133 hours of work

Language of instruction:

5 ECTS credits / 132 hours of work

Timing:

The course unit is held in the autumn semester during period 2
Course 485302A replaces this course in academic year 2020-2021.

Learning outcomes:

After completing the course, students can choose the right foundation type and design shallow and deep foundations. After completing the course the student is also able to design earth retaining structures, drainage and frost protection.

Contents:

The following topics are covered during the course: The basis of geotechnical and structural design of foundations. Foundation types and foundation construction. Piles and piled foundations. Ground bearing slabs. Gravity and embedded walls. Ground improvement. Drainage. Frost protection.

Mode of delivery:

Lecture room teaching.

Learning activities and teaching methods:

Lectures and exercises

Target group:

Master's students of environmental and civil engineering

Prerequisites and co-requisites:

Recommend course 488115A Geomechanics

Recommended or required reading:

1. Lecture material.
2. RIL 254-2016, Paalutusohje
3. RIL 263-2014 Kaivanto-ohje
4. Decoding Eurocode 7 (2008), Bond, A. and Harris, A., Taylor & Francis, (Contents are informed during lectures).

Assessment methods and criteria:

Passed practical works and exam

Grading:

Rating scale 1-5

Person responsible:

Anne Tuomela

485002S: Advanced Practical Training, 5 op

Voimassaolo: 01.08.2019 -

Opiskelumuoto: Advanced Studies

Laji: Practical training

Vastuuyksikkö: Civil Engineering field

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

477005S	Advanced Practical Training	5.0 op
460004S	Practical Training II	5.0 op

ECTS Credits:

5 ECTS, 2 months working full-time

Language of instruction:

Finnish or English

Timing:

Student usually works in summer time.

Learning outcomes:

During the advanced practical training the student is exposed to his/her working environment from the point of view of his/her studies and becomes acquainted with another possible future job or to a different assignment already in a familiar working environment. The student can identify the problems of the working environment and can solve them. The student can apply theoretical knowledge in practical tasks. The student identifies the tasks appropriate for the Master of Science in Technology at his/her workplace.

Mode of delivery:

Working as employee

Target group:

Master’s students in Civil Engineering

Assessment methods and criteria:

Student has to show original references and leave the application. In addition she/he has to participate to seminar where she/he reports own summer job. In reference must be training time period and duties.

Grading:

Verbal scale Passed/Failed

Person responsible:

Saara Luhtaanmäki

Working life cooperation:

Yes.

Choose at least 25 ECTS

466110S: Advanced topics on concrete technology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Mechanical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Jorma Hopia

Opintokohteen kielet: Finnish

Leikkaavuudet:

485115S	Advanced topics on concrete technology	5.0 op
485115S	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-compressing. 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 or required reading:

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.

Person responsible:

Jorma Hopia

Other information:

Tämä kurssi korvaa kurssin 466110S Betoniteknologian jatkokurssi 5 op, lukuvuonna 2020-2021.

466108S: Advanced topics on design of concrete structures, 6 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Mechanical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Antti Niemi

Opintokohteen kielet: Finnish

Leikkaavuudet:

485116S	Advanced topics on design of concrete structures	5.0 op
460149S	Advanced Topics on Design of Concrete Structures I	4.0 op

460149S-01 Advanced Course in Design of Concrete Structures I, examination 0.0 op
460149S-02 Advanced Course in Design of Concrete Structures I, exercises 0.0 op

ECTS Credits:

6 ECTS / 162 hours

Language of instruction:

Finnish

Timing:

Lectures and exercising on periods 1 and 2.

Learning outcomes:

Upon completion of the course, the student will be able to design reinforced concrete slabs and pre-stressed concrete beam structures to EN standards.

Contents:

Limit state design of concrete slabs and flat slabs. Limit state design of pre-stressed concrete beam structures. Fire design. Design of concrete elements. Stability and stiffening of the concrete frame in the building.

Mode of delivery:

face-to-face teaching.

Learning activities and teaching methods:

Lectures and exercising 54 hours including personal and team work. Self-reliant studying and homework 108 hours.

Target group:

Master level students focusing on structural engineering and design.

Prerequisites and co-requisites:

Recommended good skills in: 466107S Design of concrete structures. Statics, strength of materials, structural mechanics of beam, plate and shell structures. Basics in concrete technology and structural design.

Recommended or required reading:

Nykyri: BY211 Betonirakenteiden suunnittelun oppikirja, osa 1, 2013 ja osa 2, 2015; Leskelä: By210 Betonirakenteiden suunnittelu ja mitoitus 2008; By60 Suunnitteluohje EC2 osat 1-1 ja 1-2, 2008; EN 1992-1-1, EN 1992-1-2 (ja muut EN-standardit tarvittavilta osin); BY51 Betonirakenteiden käyttöikäsuunnittelu 2007; BY47 Betonirakentamisen laatuohjeet 2007; RIL 229-2-2006 Rakennesuunnittelun asiakirjaohje, Mallipiirustukset ja -laskelmat; By47 Betonirakentamisen laatuohjeet 2007; RIL202-2012 Betonirakenteiden suunnitteluohje. Martin, Purkiss: Concrete design to EN 1992, Elsevier, 2nd ed. 2006. Lecture and exercise materials.

Assessment methods and criteria:

Continuous assessment. The course can be completed by participating in intermediate exams during the course, or in final exam. Assessment criteria are based on the learning outcomes of the course.

Grading:

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

Person responsible:

Antti Niemi

Other information:

The real-time qualifications for A and AA level structural designers in Finland should be checked out at: Rakennus-, LVI- ja kiinteistöalan henkilöpätevyydet FISE Oy, http://www.fise.fi/.

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:

After completing the course the student is capable of explain the performance and design principles of welded steel structures exposed to fatigue loading. He is able to design the plated structural elements and cold-formed members. He is able to analyze and design a steel frame. He is able to analyze dynamically loaded structures and can explain the effect of vibration on steel structures strength and reliability.

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:

Major students in Structural Engineering, Mashine design, and Engineering Mechancs. 466102A

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

466112S: Advanced topics on building physics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Mechanical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Filip Fedorik

Opintokohteen kielet: English

Leikkaavuudet:

485113S Advanced topics on building physics 5.0 op

ECTS Credits:

5 ECTS credits / 132 hours of work

Language of instruction:

English

Timing:

Autumn, periods 1-2

Learning outcomes:

After completing the course the student can explain the different physical phenomena that affect the temperature and moisture behaviour of different structures. He can also study numerically the building-physical behaviour of structures and structural systems. He can use different software to simulate the behaviour and solve problems. He can assess the potential mould risk of structure based on temperature and relative humidity values measured on site.

Contents:

Computational modelling and analysis methods of building-physical behavior of structures. Site measurements. Mould index.

Mode of delivery:

Face-to-face and distance learning

Learning activities and teaching methods:

Lectures, excercises, case studies and self directed learning

Target group:

Students studying structural engineering

Prerequisites and co-requisites:

466101A Introduction to building construction, 466111S Building physics

Recommended or required reading:

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

Assessment methods and criteria:

Excercises and homework

Grading:

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

Person responsible:

Filip Fedorik

466118S: Advanced topics on structural engineering and construction technology, 5 - 10 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

Ei opintojaksokuvauksia.

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

ECTS Credits:

5 ECTS credits/133 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 how to calculate stability and settlement of municipal earth structures, design the structures against frost depth and frost heave and evaluate the needs for soil improvement. The student knows risks of the excavations and slopes and can design those using mathematical theories.

Contents:

Norms and instructions, basis of geotechnical design, earth and road structures, properties of soil material and industrial by-products, soil improvement, excavations, Property and surface drainage, lowering of groundwater table. Pipeline Construction. Specialities of railway construction and vibration problems.

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 Water and Geo Engineering study option of the Environmental Engineering program

Prerequisites and co-requisites:

Prerequisites: 488115A Geomechanics, 477032A AutoCAD and Matlab in process and environmental engineering (or similar AutoCAD knowledge)

Recommended optional programme components:

-

Recommended or required reading:

Handout and other materials delivered in lectures

Assessment methods and criteria:

Examination and homeworks
Read more about assessment criteria at the University of Oulu webpage.

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.

485305S: Modelling in 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:

488111S Modelling in Geoenvironmental Engineering 5.0 op

ECTS Credits:

5 ECTS credits/133 hours of work

Language of instruction:

Finnish

Timing:

The course unit is held in the spring semester, during period 4

Learning outcomes:

After the course the student can apply the numerical calculation methods in design and dimensioning of earth and geoenvironmental structures. The student can evaluate the influence of boundary conditions and material parameters in calculation results.

Contents:

Contaminant transport. Design and dimensioning of piles, tailings and dams structures. Settlement calculation due to different load types. Calculating the earth pressure of retaining walls. Freezing and thawing of earth structures. Geotechnical design of pile foundation.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures (10 h), design (58 h) and modelling assignments (65 h).

Target group:

Master’s students in the study option of Water and Geoenvironmental Engineering

Prerequisites and co-requisites:

The required prerequisite: 488115A Geomechanics. Also recommended: 488051A AutoCAD and Matlab in Process and Environmental Engineering, 488121S Fundamentals of Civil Engineering, 488129S Foundation Engineering, 488131S Geoenvironmental Engineering.

Recommended optional programme components:

-

Recommended or required reading:

Lecture handout and other materials delivered in lectures

Assessment methods and criteria:

Passing the course requires solving the given assignments and writing reports about them. The assignments are solved with computer modelling, which requires constant participation to the lectures.

Grading:

The course utilizes verbal grading scale pass/fail.

Person responsible:

University teacher Anne Tuomela

Working life cooperation:

The course includes guest lectures from an international consulting and engineering company.

Other information:

This course will replace course 488111S Modelling in Geoenvironmental Engineering in Academic year 2019-20.

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/133 hours of work

Language of instruction:

Finnish and option complete in English

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 know how to used by-products from industry in different applications.

Contents:

Norms and instructions, there will be a project work where student will be discover a contaminated soil and a proposal remediation technique, Properties of soil material and industrial by-products, basis of geotechnical design to landfill environment, Structures of dams and inpoundments, Challenges of mining, Remote sensing as a part of geotechnical 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 study option of Water and Geo Engineering

Prerequisites and co-requisites:

488115A Geomechanics

Recommended optional programme components:

-

Recommended or required reading:

Handout and other materials delivered in lectures

Assessment methods and criteria:

Written exam and exercises
Read more about assessment criteria at the University of Oulu webpage.

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 the Rusko waste center and also guest lectures from professionals in industry and administration.

Other information:

This course will replace course 488131S Geoenvironmental Engineering in Academic year 2019-20.

488127S: Field measurements, site investigations and geotechnical tests, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Process and Environmental Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Ali Torabi Haghighi

Opintokohteen kielet: English

Leikkaavuudet:

488118S	Laboratory Exercises and Field Measurements in Environmental Engineering	10.0 op

ECTS Credits:

5 ECTS /133 hours of work

Language of instruction:

English

Timing:

The course unit is given during periods 1 and 2

Learning outcomes:

Upon completion the student should be able to design field measurements and understand the quality of sampling and measurements in the field of environmental engineering. The student also improves skills of working in a team of fellow students to share expertise and execution responsibilities. The student understands the laboratory testing procedures and the associated parameters that help in estimating the soil mechanics and Geotechnical engineering and. The student knows how to use different methods for field measurement and sampling in water and geotechnical issues. The student can take considering the safety during the laboratory works and field measurements. After the course, the student can write detailed engineering reports.

Contents:

In the lectures: Units of measurements, error and mistake in laboratory works and field measurements, random and systematic error, precision and accuracy in laboratory work, planning field works, description of measuring site, securing results and material, sample preservation, subsoil exploration, direct & indirect methods of exploration, disturb and undisturbed samples, safety in field work, introduction on surveying, levelling, map and scale, different tests in soil mechanics laboratory.
Laboratory works in soil mechanics and geotechnical engineering: sieving test, hydrometer test, Atterberg limits test, proctor test, direct shear box test and oedometer test.
In the field: Working with GPS. Levelling and collecting data for preparing topography map. Soil sampling, surface water and groundwater sampling, Measuring velocity and discharge of river by using current meter and tracer.

Mode of delivery:

Face-to-face teaching, laboratory working

Learning activities and teaching methods:

Lectures (16 h), Fieldwork (20 h), Lab-work (9 h), Group work (88 h)

Target group:

Master students in the Water and Geo Engineering and Water and Environment study options

Prerequisites and co-requisites:

The required prerequisite is the completion of the following course prior to enrolling for the course unit: 488115A Geomechanics

Recommended optional programme components:

-

Recommended or required reading:

Field measurements and Laboratory work instruction, lecture materials

Assessment methods and criteria:

Two exams (40%), Report (50%) and assignments (10%), passing the exam is requirement for passing the course

Grading:

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

Person responsible:

University Teacher Ali Torabi Haghighi

Working life cooperation:

No

Other information:

-

485401A: Basics of Traffic Engineering, 5 op

Voimassaolo: 01.08.2019 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Civil Engineering field

Arvostelu: 1 - 5, pass, fail

Opettajat: Virve Merisalo

Opintokohteen kielet: Finnish

Leikkaavuudet:

488151A Basics of Traffic Engineering 5.0 op

ECTS Credits:

5 ECTS / 133 h of work

Language of instruction:

Finnish

Timing:

Period 1

Learning outcomes:

By completing the course the student knows the basics of modes of transport, the significance of traffic and transportation to society, traffic planning and research methods, transport economics and the external effects of transport.

Contents:

Modes of transport, Need for traffic and transportation, Transport planning and research, Economical and environmental impacts of traffic, Traffic safety.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 28 h, exercises 22 h, self-study 85 h

Target group:

Students in the Master's Programmes of environmental engineering and mechanical engineering

Prerequisites and co-requisites:

-

Recommended optional programme components:

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

Recommended or required reading:

Materials delivered during the lectures

Assessment methods and criteria:

Examination 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 Virve Merisalo

Working life cooperation:

No

Other information:

This course will replace course 488151A Basics of Traffic Engineering in Academic year 2019-20.

485402S: Advanced Course in Traffic Engineering, 5 op

Voimassaolo: 01.08.2019 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Civil Engineering field

Arvostelu: 1 - 5, pass, fail

Opettajat: Virve Merisalo

Opintokohteen kielet: Finnish

Leikkaavuudet:

488152S Advanced Course in Traffic Engineering 5.0 op

ECTS Credits:

5 ECTS / 133 h of work

Language of instruction:

Finnish

Timing:

Period 2

Learning outcomes:

By completing the course the student understands the basics of transport policy and the significance of transport economics to society. The student becomes familiar with traffic safety and is able to analyse the problems of traffic safety and opportunity to improve it.

Contents:

Transport policy, transport economics, traffic safety

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 28 h, exercises 22 h, self-study 85 h

Target group:

Students in the master’s programmes of environmental engineering and mechanical engineering

Prerequisites and co-requisites:

488151A Basics of Traffic Engineering

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:

Materials delivered during the lectures

Assessment methods and criteria:

Examination 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 Virve Merisalo

Working life cooperation:

No

Other information:

This course will replace course 488152S Advanced Course in Traffic Engineering in Academic year 2019-20.

485403A: Basics of Road Engineering, 5 op

Voimassaolo: 01.08.2019 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Civil Engineering field

Arvostelu: 1 - 5, pass, fail

Opettajat: Veikko Pekkala

Opintokohteen kielet: Finnish

Leikkaavuudet:

488153A	Basics of Road Engineering	5.0 op

ECTS Credits:

5 ECTS / 133 h of work

Language of instruction:

Finnish

Timing:

Period 3

Learning outcomes:

By completing the course the student understands the basics of road design and construction, is able to calculate structure layers of road and is familiar with the maintenance of roads

Contents:

Road and street planning and design, lining, roads structure, maintenance of roads, basics of earthworks

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 28 h, exercises 22 h, self-study 85 h

Target group:

Students in master's programmes of environmental engineering and mechanical engineering

Prerequisites and co-requisites:

-

Recommended optional programme components:

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

Recommended or required reading:

Materials delivered during the lectures

Assessment methods and criteria:

Materials delivered during the lectures

Grading:

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

Person responsible:

Veikko Pekkala

Other information:

This course will replace course 488153A Basics of Road Engineering in Academic year 2019-20.

485404S: Road Design and Construction, 5 op

Voimassaolo: 01.08.2019 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Civil Engineering field

Arvostelu: 1 - 5, pass, fail

Opettajat: Veikko Pekkala

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS / 133 h of work

Language of instruction:

Finnish

Timing:

Period 4

Learning outcomes:

By completing the course the student is familiar with road structure and function, structural modernisation, pavements and the basics of earthworks. He/she is also able to design road computer aided.

Contents:

Function of road structure, road damaging, structural modernisation, pavements, Road design and construction

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 28 h, exercises 32 h, self-study 75 h

Target group:

Students in the master's programmes of environmental engineering and mechanical engineering

Prerequisites and co-requisites:

488153A Road Design and Construction, and 488051A AutoCAD and Matlab in process and environmental engineering

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:

Materials delivered during the lectures

Assessment methods and criteria:

Examination and exercises

Grading:

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

Person responsible:

Veikko Pekkala

Other information:

This course will replace course 488154S Road Design and Construction in Academic year 2019-20.

466116S: Information modelling and automation in building construction and maintenance, 2,5 - 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Mechanical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Rauno Heikkilä

Opintokohteen kielet: Finnish

Leikkaavuudet:

485204S	Information modelling and automation in building construction and maintenance	5.0 op
460182S-01	Automation of Building and Bridge Construction, Examination	0.0 op
460182S-02	Automation of Building and Bridge Construction, Exercises	0.0 op
460182S	Automation of Building and Bridge Construction	5.0 op

ECTS Credits:

5 ECTS

Language of instruction:

Finnish

Timing:

Periods 3 and 4

Learning outcomes:

The course gives understanding about the possibilities of information modeling and automation in building construction, use and maintenance. Also it develops abilities to apply information modeling and automation in building construction and maintenance. Student will learn more about theories of information modeling and automation, different applications, software and systems, and possibilities of advanced information transferring techniques.

Contents:

Information modeling, automation and robotics in the initial data surveys, design, control of construction, as-built surveys and use and facilities management of buildings. 3-D coordinate systems in building construction process. Creation of measurement base for sites. 3-D measurement techniques and systems (robotic total station, UAS, 3-D fast surveying and modeling methods). Least squares optimization based redundancy and adjustment. Information modeling based design methods and software applications. Manufacturing automation in the factories for building components. Automated ground improvement methods and 3D-systems. Automated site construction systems and robots. Augmented reality methods and applications. Advanced maintenance methods and systems for buildings. Cloud based use and facilities management. 3-D city models. National and international Building Information Modeling (BIM) guidelines. Open information transfer formats and standards.

Learning activities and teaching methods:

Lectures, self study, excercises, site excursions, exam.

Prerequisites and co-requisites:

No specific prerequisites.

Recommended optional programme components:

Information modelling and automation in infrastructure construction and maintenance

Recommended or required reading:

Will be announced in the class.

Grading:

Opintojaksolla käytetään numeerista arviointiasteikkoa 1-5. Numeerisessa asteikossa nolla merkitsee hylättyä suoritusta.

Person responsible:

Professor Rauno Heikkilä

466115S: Information modelling and automation in intrastructure construction and maintenance, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Mechanical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Rauno Heikkilä

Opintokohteen kielet: Finnish

Leikkaavuudet:

485203A Information modelling and automation in intrastructure construction and maintenance 5.0 op

460180S-01 Automation of Road Construction, examination 0.0 op

460180S-02 Automation of Road Construction, exercises 0.0 op

460180S Automation of Road Construction 5.0 op

ECTS Credits:

5 ECTS

Language of instruction:

Finnish

Timing:

Periods 1 and 2

Learning outcomes:

The course gives understanding about the possibilities of information modeling and automation in infrastructure (roads, railways, fairways, tunnels, bridges) construction, use and maintenance. Also it develops abilities to apply information modeling and automation in infrastructure construction and maintenance. Student will learn more about theories of information modeling and automation, different applications, software and systems, and possibilities of advanced information transferring techniques.

Contents:

Information modeling and automation in the initial data surveying, design, machine and construction work process control, as-built surveys and maintenance of infrastructures. Ellipsoid and geodetic coordinate systems. Creation of 3-D measurement base for sites. Air based, mobile and ground based laser scanning methods and systems. Ground penetrating radar methods and systems. Least squares optimization based redundancy and adjustements. Information modeling based design methods and software applications. Guidance, control and autonomous machine control systems. Dynamic site control methods and systems. Augmented reality methods and applications in the infrastructure field. Advanced monitoring methods and systems. Information modeling based process, methods and systems in maintenance area. National and international information modeling guidelines (YIV2014, HB138, Bridge Information Modeling) for infrastructures. Open information transfer formats and international standards.

Mode of delivery:

Lectures, self study, excercises, site excursions, exam.

Learning activities and teaching methods:

Lectures, self study, excercises, site excursions, exam.

Target group:

Master Students of Mechanical Engineering

Prerequisites and co-requisites:

No specific perquisites.

Recommended optional programme components:

Information modelling and automation in building construction and maintenance

Recommended or required reading:

Will be announced in the class.

Assessment methods and criteria:

Passed practical works and exam

Grading:

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

Person responsible:
professor Rauno Heikkilä

485002S: Advanced Practical Training, 5 op

Voimassaolo: 01.08.2019 -
Opiskelumuoto: Advanced Studies
Laji: Practical training
Vastuuyksikkö: Civil Engineering field
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish
Leikkaavuudet:

477005S	Advanced Practical Training	5.0 op
460004S	Practical Training II	5.0 op

ECTS Credits:
5 ECTS, 2 months working full-time
Language of instruction:
Finnish or English
Timing:
Student usually works in summer time.
Learning outcomes:
During the advanced practical training the student is exposed to his/her working environment from the point of view of his/her studies and becomes acquainted with another possible future job or to a different assignment already in a familiar working environment. The student can identify the problems of the working environment and can solve them. The student can apply theoretical knowledge in practical tasks. The student identifies the tasks appropriate for the Master of Science in Technology at his/her workplace.
Mode of delivery:
Working as employee
Target group:
Master’s students in Civil Engineering
Assessment methods and criteria:
Student has to show original references and leave the application. In addition she/he has to participate to seminar where she/he reports own summer job. In reference must be training time period and duties.
Grading:
Verbal scale Passed/Failed
Person responsible:
Saara Luhtaanmäki
Working life cooperation:
Yes.

A485246: Supplementary Module / Geo Engineering, 30 op

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Supplementary Module
Laji: Study module
Vastuuyksikkö: Civil Engineering field
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

Free choice courses

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.

461103A: Strength of materials I, 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:

461010A-01	Strength of Materials I, examination	0.0 op
461010A-02	Strength of Materials I, exercises	0.0 op
461010A	Strength of Materials I	7.0 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 spring semester, during periods 3 and 4. It is recommended to complete the course at the 1st spring semester.

Learning outcomes:

After the course, the student can determine stresses and strains of structures under loading. He/she can change the general stress and strain states from one coordinate system to another and can also apply constitutive equations in calculations. The student can dimension typical structures such as tension and compression bars, torsion bars and straight beams.

Contents:

Purpose and goals of strength of materials. Experimental elastic properties and strength of steel. Tension and compression of straight bars. Round torsion bar under shear force and torsion loads. Stresses and deflection curves in straight beams under bending moments. Stress state, strain state and constitutive equations, principal stresses, Mohr's circle. Stress hypotheses.

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 Bachelor's degree students of mechanical engineering programme.

Prerequisites and co-requisites:

The recommended preceding course is 461102A Statics.

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., Pajunen, S.: Lujuusoppi, Pressus Oy, Tampere, 2010, Pennala, E.: Lujuusopin perusteet, Moniste 407, Otatieto 2002; Karhunen, J. & al.: Lujuusoppi, Otatieto 2004; Beer, F., Johnston, E., Mechanics of materials , McGraw-Hill, 2011; Gere, J.M., Timoshenko, S.P., Mechanics of Materials, Chapman&Hall, 1991.

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 looks into the most important principal concepts of strenght of materials and gives ability for dimensioning of simple structures such as straight bars in tension, compression or torsion loads and straight beams under bending moments.

466101A: Introduction to building construction, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Mechanical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Liedes, Hannu Tapani

Opintokohteen kielet: Finnish

Leikkaavuudet:

485101A	Introduction to building construction	5.0 op
460116A-01	Introduction to Contruction Engineering, examination	0.0 op
460116A-02	Introduction to Contruction Engineering, exercise work	0.0 op
460116A	Introduction to Building Construction	3.0 op

ECTS Credits:

5 ECTS credits / 132 hours of work

Language of instruction:

Finnish

Timing:

Spring, periods 3-4
Course 485101A replaces this course in academic year 2020-2021.

Learning outcomes:

After completing the course students can describe the construction process, different parties of a construction project and their role in the project. Students can also explain how laws and legislation affects the construction, design and production of building structures. They can describe the material properties of the most common construction materials. They can also explain the certification process of a building material or product and the environmental legislation in construction.

Contents:

The following topics are covered during the course: Construction law and legislation. Different phases of a construction project. The raw materials, production and properties of the most common construction materials and products. Quality assurance and certification of building products. Environmental declarations. Life cycle assessment.

Mode of delivery:

Lecture room teaching.

Learning activities and teaching methods:

Lectures and exercises

Target group:

Students studying structural engineering

Recommended or required reading:

Lecture material. Land use and building legislation. The National Building Code of Finland

Assessment methods and criteria:

Passed practical works and exam

Grading:

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

Person responsible:

University teacher Hannu Liedes

466102A: Introduction to structural design, 3 - 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Mechanical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Liedes, Hannu Tapani

Opintokohteen kielet: Finnish

Leikkaavuudet:

485102A	Introduction to structural design	5.0 op
460117A-01	Introduction to Structural Design, examination	0.0 op
460117A-02	Introduction to Structural Design, exercise work	0.0 op
460117A	Introduction to Structural Design	6.0 op

ECTS Credits:

5 ECTS credits / 132 hours of work

Language of instruction:

Finnish

Timing:

Autumn semester, periods 1-2
Course 485102A replaces this course in academic year 2020-2021.

Learning outcomes:

After completing the course the student is able to name technical regulations and instructions, which guide construction. After completing the course students can explicate principle of verifications and plastic theory on structure design and also different loads on structure. Student estimate design loads by calculation and design load effect in structures. Student can describe different structure and bracing systems.

Contents:

Regulations and supervising. The principle of design verification. The loads and effect. The principle of using of eurocode. The principle of plastic theory on on structure design. Structure systems. The joints of structures.

Mode of delivery:

Lecture room teaching.

Learning activities and teaching methods:

Lectures and exercises

Target group:

Students studying structural engineering

Prerequisites and co-requisites:

461016A Statics and 460101A Strength of Materials I

Recommended or required reading:

Lecture notes (mainly in Finnish), Finnish law and legislation, National building code of Finland, Eurocode standards

Assessment methods and criteria:

Passed practical works and exam

Grading:

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

Person responsible:

University teacher Hannu Liedes

Other information:

This course will replace course 485102A in Academic year 2020-21.

488123S: River Engineering and Hydraulic Structures, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Process and Environmental Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Ali Torabi Haghighi

Opintokohteen kielet: English

ECTS Credits:

5 ECTS /133 hours of work

Language of instruction:

English

Timing:

The course unit is held in the autumn semester during period 2 (next time in Autumn 2020).

Learning outcomes:

Upon completion the student should be able to applied the pervious learned courses (open channel Hydraulics, fluid mechanics and hydrology) in hydraulic structures design and river engineering, cclassify the hydraulic structures, purposes and functions of them and design hydraulic structures using river analysis software. The student knows structures for flood protection.

Contents:

Review of hydrology, open channel hydraulics and fluid mechanics, General Requirements and Design Considerations, River geomorphology and river engineering, Flood, managing and damage assessment, Erosion and sediment transport in river, River analysis system by using Hec-Ras software, River stability and flood control structure, Conveyance structures, Water storage structures, Protective structures, Regulating structures, Water measurement structures, Energy Dissipaters, Design small hydraulic structures

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures (24 h), group work (36 h), independent work (29 h), self-study (29 h) and seminar (15 h)

Target group:

Students in Master programs of environmental engineering and civil 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: 477052A Fluid mechanics and 488102A Hydrological Processes.

Recommended optional programme components:

The course 488113S Introduction to Surface Water Quality Modelling is recommended to take before this course unit

Recommended or required reading:

Novak, P., Moffat, A. Nalluri, C. and Narayanan, R., Hydraulic Structures, 3rd ed., 2001. U.S. Bureau of Reclamation, Design of Small Dams, U.S. Government Office, 1987. U.S. Bureau of Reclamation, Design of Small canal structures, U.S. Government Office, 1974. Lecture hand-outs.

Assessment methods and criteria:

Technical project (Using Hec-Ras for flood control Project) (30%), assignment (15%), river engineering report (15%), two exams (50%).
Read more about assessment criteria at the University of Oulu webpage.

Grading:

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

Person responsible:

Professor Björn Klöve and University Teacher Ali Torabi Haghighi

Working life cooperation:

No

Other information:

The course is arranged in alternate years (even years in the autumn semester).

488139S: Surface water quality modelling, 5 op

Voimassaolo: 28.11.2016 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Field of Process and Environmental Engineering
Arvostelu: 1 - 5, pass, fail
Opettajat: Anna-Kaisa Ronkanen
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 2 (next time in Autumn 2020)

Learning outcomes:

After completing the course, the students are able to estimate point and diffusion load from catchment to lakes or rivers and are familiar with basic limnology of these water systems. The students are also able to analyse water systems using mathematical modelling and understand main pollutant transport mechanisms so that are able to model water quality in lakes and streams. They also understand key concepts of surface water systems, and how to control nutrient and pollutant processes. The students are able to use Matlab in environmental analysis, modeling and programming.

Contents:

Modelling in water resources planning, environmental hydraulics, open channel flow, diffusive and point loading, limnology, processes and water quality, dimensional analysis, hydraulic experiments, transport of conservative and reactive solutes in water bodies. Modelling with ordinary differential equations, fully mixed systems, analytical and numerical methods for surface water modelling. Parameter estimation and uncertainty.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 26 h / guided exercises by Matlab 16 h / self-studies 91 h. Totally 133 h.

Target group:

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

Prerequisites and co-requisites:

Basic university level knowledge of mathematics and physics is required. The required prerequisite is also the completion of the following course prior to enrolling for the course unit: 488102A Hydrological Processes

Recommended optional programme components:

Matlab courses are recommended before the course unit.

Recommended or required reading:

Surface Water Quality Modelling (Chapra S, 1996, ISBN 0-0701-1-364-5). Fluvial Hydraulics: Flow and Transport Processes in Channels of Simple Geometry. (Walter HG, 1998, ISBN 0-0471-97714-4). Environmental Hydraulics of Open Channel Flows (Chanson H, 2004, ISBN 0-7506-6165-8). Lecture hand-outs and other materials delivered in lectures.

Assessment methods and criteria:

Totally 4 assignments and examination must be done and are graded on the scale 1-5. The final grade of the course is average grade of the exam and assignments.

Grading:

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

Person responsible:

University Lecturer Anna-Kaisa Ronkanen

Other information:

The course is arranged in alternate years (even years in the autumn semester).

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 /133 hours of work

Language of instruction:

English

Timing:

3rd year 3rd period

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

Working life cooperation:

No

Other information:

-

485403A: Basics of Road Engineering, 5 op

Voimassaolo: 01.08.2019 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Civil Engineering field
Arvostelu: 1 - 5, pass, fail
Opettajat: Veikko Pekkala
Opintokohteen kielet: Finnish
Leikkaavuudet:

488153A	Basics of Road Engineering	5.0 op

ECTS Credits:

5 ECTS / 133 h of work

Language of instruction:

Finnish

Timing:

Period 3

Learning outcomes:

By completing the course the student understands the basics of road design and construction, is able to calculate structure layers of road and is familiar with the maintenance of roads

Contents:

Road and street planning and design, lining, roads structure, maintenance of roads, basics of earthworks

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 28 h, exercises 22 h, self-study 85 h

Target group:

Students in master's programmes of environmental engineering and mechanical engineering

Prerequisites and co-requisites:

-

Recommended optional programme components:

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

Recommended or required reading:

Materials delivered during the lectures

Assessment methods and criteria:

Materials delivered during the lectures

Grading:

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

Person responsible:

Veikko Pekkala

Other information:

This course will replace course 488153A Basics of Road Engineering in Academic year 2019-20.

485402S: Advanced Course in Traffic Engineering, 5 op

Voimassaolo: 01.08.2019 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Civil Engineering field

Arvostelu: 1 - 5, pass, fail

Opettajat: Virve Merisalo

Opintokohteen kielet: Finnish

Leikkaavuudet:

488152S	Advanced Course in Traffic Engineering	5.0 op

ECTS Credits:

5 ECTS / 133 h of work

Language of instruction:

Finnish

Timing:

Period 2

Learning outcomes:

By completing the course the student understands the basics of transport policy and the significance of transport economics to society. The student becomes familiar with traffic safety and is able to analyse the problems of traffic safety and opportunity to improve it.

Contents:

Transport policy, transport economics, traffic safety

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 28 h, exercises 22 h, self-study 85 h

Target group:

Students in the master’s programmes of environmental engineering and mechanical engineering

Prerequisites and co-requisites:

488151A Basics of Traffic Engineering

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:

Materials delivered during the lectures

Assessment methods and criteria:

Examination 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 Virve Merisalo

Working life cooperation:

No

Other information:

This course will replace course 488152S Advanced Course in Traffic Engineering in Academic year 2019-20.

A460256: Supplementary Module/Structural Engineering and Construction Technology, 25 op

Voimassaolo: 01.08.2016 -
Opiskelumuoto: Supplementary Module
Laji: Study module
Vastuuyksikkö: Field of Mechanical Engineering
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

Ch

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:

After completing the course the student is capable of explain the performance and design principles of welded steel structures exposed to fatigue loading. He is able to design the plated structural elements and cold-formed members. He is able to analyze and design a steel frame. He is able to analyze dynamically loaded structures and can explain the effect of vibration on steel structures strength and reliability.

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:

Major students in Structural Engineering, Mashine design, and Engineering Mechancs. 466102A

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

466108S: Advanced topics on design of concrete structures, 6 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Mechanical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Antti Niemi

Opintokohteen kielet: Finnish

Leikkaavuudet:

485116S	Advanced topics on design of concrete structures	5.0 op
460149S	Advanced Topics on Design of Concrete Structures I	4.0 op
460149S-01	Advanced Course in Design of Concrete Structures I, examination	0.0 op
460149S-02	Advanced Course in Design of Concrete Structures I, exercises	0.0 op

ECTS Credits:

6 ECTS / 162 hours

Language of instruction:

Finnish

Timing:

Lectures and exercising on periods 1 and 2.

Learning outcomes:

Upon completion of the course, the student will be able to design reinforced concrete slabs and pre-stressed concrete beam structures to EN standards.

Contents:

Limit state design of concrete slabs and flat slabs. Limit state design of pre-stressed concrete beam structures. Fire design. Design of concrete elements. Stability and stiffening of the concrete frame in the building.

Mode of delivery:

face-to-face teaching.

Learning activities and teaching methods:

Lectures and exercising 54 hours including personal and team work. Self-reliant studying and homework 108 hours.

Target group:

Master level students focusing on structural engineering and design.

Prerequisites and co-requisites:

Recommended good skills in: 466107S Design of concrete structures. Statics, strength of materials, structural mechanics of beam, plate and shell structures. Basics in concrete technology and structural design.

Recommended or required reading:

Nykyri: BY211 Betonirakenteiden suunnittelun oppikirja, osa 1, 2013 ja osa 2, 2015; Leskelä: By210 Betonirakenteiden suunnittelu ja mitoitus 2008; By60 Suunnitteluohje EC2 osat 1-1 ja 1-2, 2008; EN 1992-1-1, EN 1992-1-2 (ja muut EN-standardit tarvittavilta osin); BY51 Betonirakenteiden käyttöikäsuunnittelu 2007; BY47 Betonirakentamisen laatuohjeet 2007; RIL 229-2-2006 Rakennesuunnittelun asiakirjaohje, Mallipiirustukset ja -laskelmat; By47 Betonirakentamisen laatuohjeet 2007; RIL202-2012 Betonirakenteiden suunnitteluohje. Martin, Purkiss: Concrete design to EN 1992, Elsevier, 2nd ed. 2006. Lecture and exercise materials.

Assessment methods and criteria:

Continuous assessment. The course can be completed by participating in intermediate exams during the course, or in final exam. Assessment criteria are based on the learning outcomes of the course.

Grading:

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

Person responsible:

Antti Niemi

Other information:

The real-time qualifications for A and AA level structural designers in Finland should be checked out at: Rakennus-, LVI- ja kiinteistöalan henkilöpätevyydet FISE Oy, http://www.fise.fi/.

466110S: Advanced topics on concrete technology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Mechanical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Jorma Hopia

Opintokohteen kielet: Finnish

Leikkaavuudet:

485115S Advanced topics on concrete technology 5.0 op
485115S 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-compressing. 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 or required reading:

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.

Person responsible:

Jorma Hopia

Other information:

Tämä kurssi korvaa kurssin 466110S Betoniteknologian jatkokurssi 5 op, lukuvuonna 2020-2021.

466112S: Advanced topics on building physics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Mechanical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Filip Fedorik

Opintokohteen kielet: English

Leikkaavuudet:

485113S Advanced topics on building physics 5.0 op

ECTS Credits:

5 ECTS credits / 132 hours of work

Language of instruction:

English

Timing:

Autumn, periods 1-2

Learning outcomes:

After completing the course the student can explain the different physical phenomena that affect the temperature and moisture behaviour of different structures. He can also study numerically the building-physical behaviour of structures and structural systems. He can use different software to simulate the behaviour and solve problems. He can assess the potential mould risk of structure based on temperature and relative humidity values measured on site.

Contents:

Computational modelling and analysis methods of building-physical behavior of structures. Site measurements. Mould index.

Mode of delivery:

Face-to-face and distance learning

Learning activities and teaching methods:

Lectures, excercises, case studies and self directed learning

Target group:

Students studying structural engineering

Prerequisites and co-requisites:

466101A Introduction to building construction, 466111S Building physics

Recommended or required reading:

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

Assessment methods and criteria:

Excercises and homework

Grading:

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

Person responsible:

Filip Fedorik

466115S: Information modelling and automation in intrastructure construction and maintenance, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Mechanical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Rauno Heikkilä

Opintokohteen kielet: Finnish

Leikkaavuudet:

485203A Information modelling and automation in intrastructure construction and maintenance 5.0 op

460180S-01 Automation of Road Construction, examination 0.0 op

460180S-02 Automation of Road Construction, exercises 0.0 op

460180S Automation of Road Construction 5.0 op

ECTS Credits:

5 ECTS

Language of instruction:

Finnish

Timing:

Periods 1 and 2

Learning outcomes:

The course gives understanding about the possibilities of information modeling and automation in infrastructure (roads, railways, fairways, tunnels, bridges) construction, use and maintenance. Also it develops abilities to apply information modeling and automation in infrastructure construction and maintenance. Student will learn more about theories of information modeling and automation, different applications, software and systems, and possibilities of advanced information transferring techniques.

Contents:

Information modeling and automation in the initial data surveying, design, machine and construction work process control, as-built surveys and maintenance of infrastructures. Ellipsoid and geodetic coordinate systems. Creation of 3-D measurement base for sites. Air based, mobile and ground based laser scanning methods and systems. Ground penetrating radar methods and systems. Least squares optimization based redundancy and adjustements. Information modeling based design methods and software applications. Guidance, control and autonomous machine control systems. Dynamic site control methods and systems. Augmented reality methods and applications in the infrastructure field. Advanced monitoring methods and systems. Information modeling based process, methods and systems in maintenance area. National and international information modeling guidelines (YIV2014, HB138, Bridge Information Modeling) for infrastructures. Open information transfer formats and international standards.

Mode of delivery:

Lectures, self study, excercises, site excursions, exam.

Learning activities and teaching methods:

Lectures, self study, excercises, site excursions, exam.

Target group:

Master Students of Mechanical Engineering

Prerequisites and co-requisites:

No specific perquisites.

Recommended optional programme components:

Information modelling and automation in building construction and maintenance

Recommended or required reading:

Will be announced in the class.

Assessment methods and criteria:

Passed practical works and exam

Grading:

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

Person responsible:

professor Rauno Heikkilä

466116S: Information modelling and automation in building construction and maintenance, 2,5 - 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Mechanical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Rauno Heikkilä

Opintokohteen kielet: Finnish

Leikkaavuudet:

485204S Information modelling and automation in building construction and maintenance 5.0 op

460182S-01 Automation of Building and Bridge Construction, Examination 0.0 op

460182S-02 Automation of Building and Bridge Construction, Exercises 0.0 op

460182S Automation of Building and Bridge Construction 5.0 op

ECTS Credits:

5 ECTS

Language of instruction:

Finnish

Timing:

Periods 3 and 4

Learning outcomes:

The course gives understanding about the possibilities of information modeling and automation in building construction, use and maintenance. Also it develops abilities to apply information modeling and automation in building construction and maintenance. Student will learn more about theories of information modeling and automation, different applications, software and systems, and possibilities of advanced information transferring techniques.

Contents:

Information modeling, automation and robotics in the initial data surveys, design, control of construction, as-built surveys and use and facilities management of buildings. 3-D coordinate systems in building construction process. Creation of measurement base for sites. 3-D measurement techniques and systems (robotic total station, UAS, 3-D fast surveying and modeling methods). Least squares optimization based redundancy and adjustment. Information modeling based design methods and software applications. Manufacturing automation in the factories for building components. Automated ground improvement methods and 3D-systems. Automated site construction systems and robots. Augmented reality methods and applications. Advanced maintenance methods and systems for buildings. Cloud based use and facilities management. 3-D city models. National and international Building Information Modeling (BIM) guidelines. Open information transfer formats and standards.

Learning activities and teaching methods:

Lectures, self study, excercises, site excursions, exam.

Prerequisites and co-requisites:

No specific prerequisites.

Recommended optional programme components:

Information modelling and automation in infrastructure construction and maintenance

Recommended or required reading:

Will be announced in the class.

Grading:

Opintojaksolla käytetään numeerista arviointiasteikkoa 1-5. Numeerisessa asteikossa nolla merkitsee hylättyä suoritusta.

Person responsible:

Professor Rauno Heikkilä

466118S: Advanced topics on structural engineering and construction technology, 5 - 10 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

Ei opintojaksokuvauksia.

488127S: Field measurements, site investigations and geotechnical tests, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Process and Environmental Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Ali Torabi Haghighi

Opintokohteen kielet: English

Leikkaavuudet:

488118S Laboratory Exercises and Field Measurements in Environmental Engineering 10.0 op

ECTS Credits:

5 ECTS /133 hours of work

Language of instruction:

English

Timing:

The course unit is given during periods 1 and 2

Learning outcomes:

Upon completion the student should be able to design field measurements and understand the quality of sampling and measurements in the field of environmental engineering. The student also improves skills of working in a team of fellow students to share expertise and execution responsibilities. The student understands the laboratory testing procedures and the associated parameters that help in estimating the soil mechanics and Geotechnical engineering and. The student knows how to use different methods for field measurement and sampling in water and geotechnical issues. The student can take considering the safety during the laboratory works and field measurements. After the course, the student can write detailed engineering reports.

Contents:

In the lectures: Units of measurements, error and mistake in laboratory works and field measurements, random and systematic error, precision and accuracy in laboratory work, planning field works, description of measuring site, securing results and material, sample preservation, subsoil exploration, direct & indirect methods of exploration, disturb and undisturbed samples, safety in field work, introduction on surveying, levelling, map and scale, different tests in soil mechanics laboratory.
Laboratory works in soil mechanics and geotechnical engineering: sieving test, hydrometer test, Atterberg limits test, proctor test, direct shear box test and oedometer test.
In the field: Working with GPS. Levelling and collecting data for preparing topography map. Soil sampling, surface water and groundwater sampling, Measuring velocity and discharge of river by using current meter and tracer.

Mode of delivery:

Face-to-face teaching, laboratory working

Learning activities and teaching methods:

Lectures (16 h), Fieldwork (20 h), Lab-work (9 h), Group work (88 h)

Target group:

Master students in the Water and Geo Engineering and Water and Environment study options

Prerequisites and co-requisites:

The required prerequisite is the completion of the following course prior to enrolling for the course unit: 488115A Geomechanics

Recommended optional programme components:

-

Recommended or required reading:

Field measurements and Laboratory work instruction, lecture materials

Assessment methods and criteria:

Two exams (40%), Report (50%) and assignments (10%), passing the exam is requirement for passing the course

Grading:

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

Person responsible:

University Teacher Ali Torabi Haghighi

Working life cooperation:

No

Other information:

-

485401A: Basics of Traffic Engineering, 5 op

Voimassaolo: 01.08.2019 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Civil Engineering field

Arvostelu: 1 - 5, pass, fail

Opettajat: Virve Merisalo

Opintokohteen kielet: Finnish

Leikkaavuudet:

488151A	Basics of Traffic Engineering	5.0 op

ECTS Credits:

5 ECTS / 133 h of work

Language of instruction:

Finnish

Timing:

Period 1

Learning outcomes:

By completing the course the student knows the basics of modes of transport, the significance of traffic and transportation to society, traffic planning and research methods, transport economics and the external effects of transport.

Contents:

Modes of transport, Need for traffic and transportation, Transport planning and research, Economical and environmental impacts of traffic, Traffic safety.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 28 h, exercises 22 h, self-study 85 h

Target group:

Students in the Master's Programmes of environmental engineering and mechanical engineering

Prerequisites and co-requisites:

-

Recommended optional programme components:

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

Recommended or required reading:

Materials delivered during the lectures

Assessment methods and criteria:

Examination 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 Virve Merisalo

Working life cooperation:

No

Other information:

This course will replace course 488151A Basics of Traffic Engineering in Academic year 2019-20.

485402S: Advanced Course in Traffic Engineering, 5 op

Voimassaolo: 01.08.2019 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Civil Engineering field

Arvostelu: 1 - 5, pass, fail

Opettajat: Virve Merisalo

Opintokohteen kielet: Finnish

Leikkaavuudet:

488152S	Advanced Course in Traffic Engineering	5.0 op

ECTS Credits:

5 ECTS / 133 h of work

Language of instruction:

Finnish

Timing:

Period 2

Learning outcomes:

By completing the course the student understands the basics of transport policy and the significance of transport economics to society. The student becomes familiar with traffic safety and is able to analyse the problems of traffic safety and opportunity to improve it.

Contents:

Transport policy, transport economics, traffic safety

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 28 h, exercises 22 h, self-study 85 h

Target group:

Students in the master’s programmes of environmental engineering and mechanical engineering

Prerequisites and co-requisites:

488151A Basics of Traffic Engineering

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:

Materials delivered during the lectures

Assessment methods and criteria:

Examination 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 Virve Merisalo

Working life cooperation:

No

Other information:

This course will replace course 488152S Advanced Course in Traffic Engineering in Academic year 2019-20.

485403A: Basics of Road Engineering, 5 op

Voimassaolo: 01.08.2019 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Civil Engineering field

Arvostelu: 1 - 5, pass, fail

Opettajat: Veikko Pekkala

Opintokohteen kielet: Finnish

Leikkaavuudet:

488153A	Basics of Road Engineering	5.0 op

ECTS Credits:

5 ECTS / 133 h of work

Language of instruction:

Finnish

Timing:

Period 3

Learning outcomes:

By completing the course the student understands the basics of road design and construction, is able to calculate structure layers of road and is familiar with the maintenance of roads

Contents:

Road and street planning and design, lining, roads structure, maintenance of roads, basics of earthworks

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 28 h, exercises 22 h, self-study 85 h

Target group:

Students in master's programmes of environmental engineering and mechanical engineering

Prerequisites and co-requisites:

-

Recommended optional programme components:

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

Recommended or required reading:

Materials delivered during the lectures

Assessment methods and criteria:

Materials delivered during the lectures

Grading:

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

Person responsible:

Veikko Pekkala

Other information:

This course will replace course 488153A Basics of Road Engineering in Academic year 2019-20.

485404S: Road Design and Construction, 5 op

Voimassaolo: 01.08.2019 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Civil Engineering field
Arvostelu: 1 - 5, pass, fail
Opettajat: Veikko Pekkala
Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS / 133 h of work

Language of instruction:

Finnish

Timing:

Period 4

Learning outcomes:

By completing the course the student is familiar with road structure and function, structural modernisation, pavements and the basics of earthworks. He/she is also able to design road computer aided.

Contents:

Function of road structure, road damaging, structural modernisation, pavements, Road design and construction

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 28 h, exercises 32 h, self-study 75 h

Target group:

Students in the master's programmes of environmental engineering and mechanical engineering

Prerequisites and co-requisites:

488153A Road Design and Construction, and 488051A AutoCAD and Matlab in process and environmental engineering

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:

Materials delivered during the lectures

Assessment methods and criteria:

Examination and exercises

Grading:

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

Person responsible:

Veikko Pekkala

Other information:

This course will replace course 488154S Road Design and Construction in Academic year 2019-20.

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

ECTS Credits:

5 ECTS credits/133 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 how to calculate stability and settlement of municipal earth structures, design the structures against frost depth and frost heave and evaluate the needs for soil improvement. The student knows risks of the excavations and slopes and can design those using mathematical theories.

Contents:

Norms and instructions, basis of geotechnical design, earth and road structures, properties of soil material and industrial by-products, soil improvement, excavations, Property and surface drainage, lowering of groundwater table. Pipeline Construction. Specialities of railway construction and vibration problems.

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 Water and Geo Engineering study option of the Environmental Engineering program

Prerequisites and co-requisites:

Prerequisites: 488115A Geomechanics, 477032A AutoCAD and Matlab in process and environmental engineering (or similar AutoCAD knowledge)

Recommended optional programme components:

-

Recommended or required reading:

Handout and other materials delivered in lectures

Assessment methods and criteria:

Examination and homeworks
Read more about assessment criteria at the University of Oulu webpage.

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.

485991S: Master's Thesis Seminar, 0 op

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Civil Engineering field
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

485999S: Master's Thesis in Civil Engineering, 30 op

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Advanced Studies
Laji: Diploma thesis
Vastuuyksikkö: Civil Engineering field
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

ECTS Credits:
30 ects
Language of instruction:
Finnish/English
Timing:
Recommended timing the spring term of the 2nd year of the master level.
Learning outcomes:
Upon completion of the thesis the student recognizes practical problems, she/he be able to create a research plan and research questions. She/He is able to plan the project and manage her/his own work according to the timetable. Student controlls different kind of research methods and be able to apply skills learned during master's studies to solving asked research questions. She/he understand practical meanings of solutions, limited and know if there is some useful outputs. The student can also utilize different information sources and critically evaluate the information obtained. The student is able to produce clear and finalized text, in line with technical and scientific writing practices.
Contents:
The student defines the contents of his / her work, consulting the supervisor of the Master's thesis. The responsible person of degree programme accepts the contents, the subject and the topic of the thesis work.
Mode of delivery:
Individual work. The diploma thesis completes the master's degree studies.
Learning activities and teaching methods:
The Master's thesis work is supervised by a staff member of the Faculty and doing with industrial company.
Target group:
Civil Engineering Master's students
Prerequisites and co-requisites:
Master's level studies of Degree programme.
Assessment methods and criteria:
The thesis work is made independently by the student as planned. The thesis work is saved digitally and reviewed through the University of Oulu Laturi electronic thesis (E-thesis) submission system. Final written report will evaluate.
Grading:
The course unit utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.
Person responsible:
Thesis' supervisor
Working life cooperation:
Working in or with the industrial company.

485990S: Maturity Test, Civil Engineering, 0 op

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Advanced Studies

Laji: Course
Vastuuyksikkö: Civil Engineering field
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

ECTS Credits:
0 ects
Language of instruction:
Finnish, Swedish or English.
Timing:
After completion of the master's thesis.
Learning outcomes:
The student can produce text in popular form of the research field and thus show ones familiarity to the field.
Contents:
Depends on the topic of the thesis.
Mode of delivery:
Literary work.
Learning activities and teaching methods:
Exam
Target group:
Master Students of Civil Engineering
Recommended optional programme components:
Will be written after the Master's Thesis has been submitted for review.
Assessment methods and criteria:
Student writes an essay about the topic of the Master's thesis to show a good command of the content of the thesis.
Grading:
Pass or fail
Person responsible:
Supervisor of Thesis

A485120: Civil Engineering, Basic Studies, 70 op

Voimassaolo: 01.08.2018 -
Opiskelumuoto: Basic Studies
Laji: Study module
Vastuuyksikkö: Civil Engineering field
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

Basic Studies

485000P: Planning of Studies and Career, 1 op

Voimassaolo: 01.08.2019 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Civil Engineering field
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

ECTS Credits:
1 ECTS /28 hours of work
Language of instruction:
Finnish
Timing:

The course unit is held in the autumn semester, during periods 1 and 2.

Learning outcomes:

The aim of the course is to introduce new students to the university, academic studies, the department and the studies of his/her degree programme in the faculty of Technlogy.

Contents:

Issues related to the beginning of the studies. Goals, structure and contents of the studies in the Faculty of Technology. Preparing a personal study plan. Study technique and the library.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Tutorials, information days organized by the faculty and by the degree programmes, independent studying.

Target group:

All first year students in degree programme in Civil Engineering

Prerequisites and co-requisites:

-

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Participation to the tutorials and information sessions and doing the personal study plan. Student have to participate 2 times in Master's Thesis Seminars (485991S) and some exercises topics of Study skills and competences.

Grading:

Verbal scale Passed/Failed

Person responsible:

Reijo Saari

031010P: Calculus I, 5 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Applied Mathematics and Computational Mathematics

Arvostelu: 1 - 5, pass, fail

Opettajat: Pauliina Uusitalo, Ilkka Lusikka

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay031010P	Calculus I (OPEN UNI)	5.0 op

ECTS Credits:

5 ECTS credits / 135 hours of work

Language of instruction:

Finnish. The course can be completed in English by intermediate exams or by a final exam.

Timing:

Autumn semester, period 1

Learning outcomes:

Upon completion of the course, the student identifies concepts of vector algebra, can use vector algebra for solving problems of analytic geometry, can explain basic characteristics of elementary functions, is able to analyse the limit and the continuity of real valued functions of one variable, can solve problems associated with differential and integral calculus of real valued functions of one variable.

Contents:

Vector algebra and analytic geometry. Limit, continuity, differential and integral calculus and applications of real valued functions of one variable. Complex numbers.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures 28 h / Group work 22 h / Self-study 85 h.

Target group:

-

Prerequisites and co-requisites:

-

Recommended optional programme components:

-

Recommended or required reading:

Grossman, S.I.: Calculus of One Variable; Grossman, S.I.: Multivariable Calculus, Linear Algebra, and Differential Equations (partly); Adams, R.A.: A Complete Course Calculus (partly)

Assessment methods and criteria:

Intermediate exams or a final exam.
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:

Pauliina Uusitalo

Working life cooperation:

-

Other information:

-

031075P: Calculus II, 5 op

Voimassaolo: 01.08.2015 -
Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Applied Mathematics and Computational Mathematics
Arvostelu: 1 - 5, pass, fail
Opettajat: Pauliina Uusitalo
Opintokohteen kielet: Finnish
Leikkaavuudet:

ay031075P	Calculus II (OPEN UNI)	5.0 op
031011P	Calculus II	6.0 op

ECTS Credits:

5 ECTS credits / 135 hours of work

Language of instruction:

Finnish. The course can be completed in English by intermediate exams or by a final exam.

Timing:

Spring semester, period 3

Learning outcomes:

Upon completion of the course, the student is able to examine the convergence of series and power series of real terms, can explain the use of power series e.g. in calculating limits, is able to solve problems related to differential and integral calculus of real and vector valued functions of several variables.

Contents:

Sequences, series, power series and Fourier series of real terms. Differential and integral calculus of real and vector valued functions of several variables.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 28 h / Group work 22 h / Self-study 85 h.

Target group:

-

Prerequisites and co-requisites:

The recommended prerequisite is the completion of the course 031010P Calculus I.

Recommended optional programme components:

-

Recommended or required reading:

Kreyszig, E: Advanced Engineering Mathematics; Grossman S.I.: Multivariable Calculus, Linear Algebra, and Differential Equations; Adams, R.A.: A Complete Course Calculus.

Assessment methods and criteria:

Intermediate exams or a final exam.
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:

Ilkka Lusikka

Working life cooperation:

-

Other information:

-

031076P: Differential Equations, 5 op

Voimassaolo: 01.08.2015 -
Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Applied Mathematics and Computational Mathematics
Arvostelu: 1 - 5, pass, fail
Opettajat: Ruotsalainen Keijo
Opintokohteen kielet: Finnish
Leikkaavuudet:

ay031076P	Differential Equations (OPEN UNI)	5.0 op
800320A	Differential equations	5.0 op
031017P	Differential Equations	4.0 op

ECTS Credits:

5 ECTS credits / 135 hours of work

Language of instruction:

Finnish

Timing:

The course is held in the spring, during period 4. It is recommended to complete the course at the 1th spring semester.

Learning outcomes:

The students can apply differential equations as a mathematical model. They can identify and solve various differential equations and they have knowledge on basic solvability of differential equations. The student can use the Laplace transform as a solution method.

Contents:

Ordinary differential equations of first and higher order.
Laplace transform with applications to differential equations.

Mode of delivery:

Face-to-face teaching, Stack/Moodle digital learning environment

Learning activities and teaching methods:

Lectures 28 h / Group work 22 h / Self-study 85 h.

Target group:

1. year students of engineering, mathematics and physics.

Prerequisites and co-requisites:

The recommended prerequisite is the completion of the course Calculus I.

Recommended optional programme components:

-

Recommended or required reading:

Recommended literature: Kreyszig, E: Advanced Engineering Mathematics;

Assessment methods and criteria:

The course can be completed by intermediate exams (2 exams) or by a final exam.
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:

Keijo Ruotsalainen

Working life cooperation:

No

031021P: Probability and Mathematical Statistics, 5 op

Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Applied Mathematics and Computational Mathematics
Arvostelu: 1 - 5, pass, fail
Opettajat: Jukka Kemppainen
Opintokohteen kielet: Finnish
Leikkaavuudet:

ay031021P	Probability and Mathematical Statistics (OPEN UNI)	5.0 op

ECTS Credits:

5 ECTS credits / 135 hours of work

Language of instruction:

Finnish

Timing:

Spring semester, period 3

Learning outcomes:

After completing the course the student

1. knows the key concepts of probability and the most important random variables,
2. will be able to use them in calculating probabilities and parameters of probability distributions,
3. is capable of analyzing statistical data by calculating interval and point estimates for the parameters,
4. will be able to formulate statistical hypotheses and test them,
5. knows the basics of linear regression.

Contents:

The key concepts of probability, random variable, parameters of probability distributions, estimation of parameters, hypothesis testing, regression analysis.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 28 h/Exercises 20 h/Self study 87 h.

Target group:

The students in the engineering sciences. Other students are welcome, too.

Prerequisites and co-requisites:

The recommended prerequisities are the course 031010P Calculus I and some parts of the course 031075P Calculus II.

Recommended optional programme components:

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

Recommended or required reading:

Milton, J.S., Arnold, J.C. (1992): Introduction to Probability and Statistics.

Assessment methods and criteria:

Intermediate exams or a final exam.
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:

Jukka Kemppainen

Working life cooperation:

-

031078P: Matrix Algebra, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Applied Mathematics and Computational Mathematics

Arvostelu: 1 - 5, pass, fail

Opettajat: Matti Peltola

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay031078P	Matrix Algebra (OPEN UNI)	5.0 op
031019P	Matrix Algebra	3.5 op

ECTS Credits:

5 ECTS credits / 135 hours of work

Language of instruction:

Finnish

Timing:

The course is held in the autumn, during period 2. It is recommended to complete the course at the 1th autumn semester.

Learning outcomes:

The student is able to apply arithmetic operations of matrices and can solve system of linear equations by matrix methods and can apply matrix factorizations to find the solution of the system of linear equations. The student is able to recognize the vector space and understands the concepts of basis and dimension of a vector space and can analyse matrices by the parameters, vectors and vector spaces of matrices. He /She knows how to calculate determinant, eigenvalues and eigenvectors of a square matrix, and is able to diagonalize matrices and apply diagonalization to the simple problems.

Contents:

1. Vectors and matrices 2. Systems of linear equations. 3. Matrix factorizations. 4. Vector spaces. 5. The rank, nullity, row space and the column space of a matrix. 6. The determinant of a matrix. 7. Eigenvalues and eigenvectors of a matrix. 8. The diagonalization with applications.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 28 h / Group work 22 h / Self-study 85 h.

Target group:

1. year students of technical sciences, mathematics and physics.

Prerequisites and co-requisites:

-

Recommended optional programme components:

-

Recommended or required reading:

Recommented literature: Grossman, S.I: Elementary Linear Algebra; David C. Lay: Linear Algebra and Its Applications.

Assessment methods and criteria:

The course can be completed by intermediate exams (2 exams) or by a final exam.
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 Peltola

Working life cooperation:

-

Other information:

-

780120P: Basic Principles in Chemistry, 5 op

Voimassaolo: 01.08.2016 -
Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Field of Chemistry
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish
Leikkaavuudet:

780117P	General and Inorganic Chemistry A	5.0 op
780109P	Basic Principles in Chemistry	4.0 op

ECTS Credits:

5 credits / 134 hours of work

Language of instruction:

Finnish

Timing:

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

Learning outcomes:

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

Contents:

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

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

40 hours of lectures and 94 hours of self-study

Target group:

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

Prerequisites and co-requisites:

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

Recommended optional programme components:

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

Recommended or required reading:

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

Assessment methods and criteria:

Final examination.
Read more about assessment criteria at the University of Oulu webpage.

Grading:

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

Person responsible:

Minna Tiainen

Working life cooperation:

No

761119P: Electromagnetism 1, 5 op

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Field of Physics
Arvostelu: 1 - 5, pass, fail
Opettajat: Timo Asikainen
Opintokohteen kielet: Finnish
Leikkaavuudet:

761113P-01	Electricity and magnetism, lectures and exam	0.0 op
761113P-02	Electricity and magnetism, lab. exercises	0.0 op
761113P	Electricity and magnetism	5.0 op
766319A	Electromagnetism	7.0 op
761103P	Electricity and Magnetism	4.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work
- 761119P-01, Lectures and exam (4 cr)
- 761119P-02, Lab. exercises (1 cr)

Language of instruction:

Finnish

Timing:

Second fall term

Learning outcomes:

The student will be able to understand the basic concepts of electromagnetism and can apply this understanding to solve problems related to electromagnetism.

Contents:

Basic principles of electromagnetic phenomena and their physical and geometric interpretation. More detailed contents will be presented later.

Mode of delivery:

face-to-face teaching

Learning activities and teaching methods:

Lectures 32 h, 7 exercises (14 h), 2 laboratory exercises (3 hours/exercise), self-study 83 h

Target group:

For the students of the University of Oulu.

Prerequisites and co-requisites:

Knowledge of vector calculus and basics of differential and integral calculus.

Recommended optional programme components:

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

Recommended or required reading:

Text book: H.D. Young and R.A. Freedman: University physics, Addison-Wesley, 13. ed., chapters 21-31. Also other editions can be used. Lecture material in finnish.

Assessment methods and criteria:

Both parts (761119P-01 and 761119P-02) will be graded separately. The final grade of the course is the weighted average of the grades of part 1 (4 cr) and part 2 (1 cr).
761119P-01: Three small midterm exams or final examination
761119P-02: Two laboratory exercises
Read more about assessment criteria at the University of Oulu webpage.

Grading:

Numerical grading scale 0 – 5, where 0 = fail

Person responsible:

Timo Asikainen

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.

461103A: Strength of materials I, 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:

461010A-01 Strength of Materials I, examination 0.0 op

461010A-02 Strength of Materials I, exercises 0.0 op

461010A Strength of Materials I 7.0 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 spring semester, during periods 3 and 4. It is recommended to complete the course at the 1st spring semester.

Learning outcomes:

After the course, the student can determine stresses and strains of structures under loading. He/she can change the general stress and strain states from one coordinate system to another and can also apply constitutive equations in calculations. The student can dimension typical structures such as tension and compression bars, torsion bars and straight beams.

Contents:

Purpose and goals of strength of materials. Experimental elastic properties and strength of steel. Tension and compression of straight bars. Round torsion bar under shear force and torsion loads. Stresses and deflection curves in straight beams under bending moments. Stress state, strain state and constitutive equations, principal stresses, Mohr's circle. Stress hypotheses.

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 Bachelor's degree students of mechanical engineering programme.

Prerequisites and co-requisites:

The recommended preceding course is 461102A Statics.

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., Pajunen, S.: Lujuusoppi, Pressus Oy, Tampere, 2010, Pennala, E.: Lujuusopin perusteet, Moniste 407, Otatieto 2002; Karhunen, J. & al.: Lujuusoppi, Otatieto 2004; Beer, F., Johnston, E., Mechanics of materials , McGraw-Hill, 2011; Gere, J.M., Timoshenko, S.P., Mechanics of Materials, Chapman&Hall, 1991.

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 looks into the most important principal concepts of strenght of materials and gives ability for dimensioning of simple structures such as straight bars in tension, compression or torsion loads and straight beams under bending moments.

555265P: Occupational Safety and Health Management, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Industrial Engineering and Management

Arvostelu: 1 - 5, pass, fail

Opettajat: Henri Jounila

Opintokohteen kielet: Finnish

Leikkaavuudet:

555263A	Technology, Society and Work	2.0 op
555260P	Basic Course in Occupational Safety and Wellbeing at Work	3.0 op

ECTS Credits:

5 ECTS credits.

Language of instruction:

Finnish. English material is also used.

Timing:

Periods 3-4.

Learning outcomes:

Upon completion of the course, the student will be able to:

- explain the basic terms of occupational safety and health
- assess the importance of occupational safety, health and well-being at work
- assess the significance of occupational safety in the improving of productivity and quality
- apply different safety analysis
- explain core issues of occupational safety and health management

Contents:

Occupational safety and health, safety management, safety culture, laws and standards, hazards and risks, occupational diseases and work accidents, safety analysis, occupational safety at shared industrial work sites, occupational safety card, HSEQ-assessment procedure, other current issues.

Mode of delivery:

The tuition will be implemented as face-to-face teaching.

Learning activities and teaching methods:

Lectures and assignments 26 h / group work 40 h / tasks and self-study 68 h.

Target group:

Industrial Engineering and Management, Mechanical Engineering, Process Engineering and Environmental Engineering students.

Prerequisites and co-requisites:

-

Recommended optional programme components:

-

Recommended or required reading:

Mertanen V. 2015. Työturvallisuuden perusteet. Helsinki: Työterveyslaitos. Lecture materials. Other materials will be defined during the course.

Assessment methods and criteria:

Group work 0-5, the assessment of the tasks will be informed at the beginning of the course.

Grading:

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

Person responsible:

MSc Henri Jounila

Working life cooperation:

-

Other information:

Substitutes courses 555260P Basic Course in Occupational Safety and Wellbeing at Work + 555263A Technology, Society and Work.

485021A: Construction Contracting, 5 op

Voimassaolo: 01.08.2018 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Civil Engineering field
Arvostelu: 1 - 5, pass, fail
Opettajat: Liedes, Hannu Tapani
Opintokohteen kielet: Finnish
Leikkaavuudet:

488119A	Basics of infrastructure planning and development	5.0 op
466113S	Construction economics	5.0 op
460165A-02	Introduction to Construction Economics I, practical work	0.0 op
460165A-01	Introduction to Construction Economics I, examination	0.0 op

ECTS Credits:

5 ECTS

Language of instruction:

Finnish

Person responsible:

Hannu Liedes

Other information:

This Course replaces courses 466113S and 488119A.

555285A: Project management, 5 op

Voimassaolo: 01.01.2014 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Field of Industrial Engineering and Management
Arvostelu: 1 - 5, pass, fail
Opettajat: Kirsi Aaltonen
Opintokohteen kielet: Finnish
Leikkaavuudet:

555288A	Project Management	5.0 op
ay555285A	Project management (OPEN UNI)	5.0 op
555282A	Project Management	4.0 op
555280P	Basic Course of Project Management	2.0 op

ECTS Credits:

5 ECTS credits.

Language of instruction:

Finnish. English material may also be used.

Timing:

Period 2.

Learning outcomes:

Upon completion of the course, the student will be able to:

- describe explain the essential concepts and methods related to project management
- apply project management methods to create a schedule for a project and calculate critical path
- understand essential concepts related to project cost management and able to apply earned value method and three point estimate to manage project costs
- recognises the essential tasks of project risk management

Contents:

Defining project management, project goals and objectives, project phases and project life-cycle management, project planning, organising and scope management, schedule management, cost management, earned value calculation and project risk management, project stakeholder management, project communications management, the role of project manager, new modes of project delivery

Mode of delivery:

The tuition will be implemented as web-based teaching.

Learning activities and teaching methods:

Web-based lectures 16h, self-study 118h

Target group:

Industrial Engineering and Management students and other students taking Industrial Engineering and Management as minor.

Prerequisites and co-requisites:

No prerequisites exist.

Recommended optional programme components:

This course is part of the 25 ECTS module of Industrial engineering and management that also includes555225P Basics of industrial engineering and management, 555242A Product development, 555264P Managing well-being and quality of working life, and 555286A Process and quality management.

Recommended or required reading:

Lecture material, exercise book, Artto, Martinsuo & Kujala 2006. Projektiliiketoiminta. WSOY

Assessment methods and criteria:

Assignments, exercise book and exam. The course grading is based on the exam. Well completed assignments and exercise book may raise grading.

Grading:

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

Person responsible:

Assistant professor Kirsi Aaltonen

Working life cooperation:

The course includes guest lectures from industry

Other information:

Substitutes courses 555280P Basic Course of Project Management + 555282A Project Management.

030005P: Information Skills, 1 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Technology

Arvostelu: 1 - 5, pass, fail

Opettajat: Ursula Heinikoski

Opintokohteen kielet: Finnish

Leikkaavuudet:

030004P Introduction to Information Retrieval 0.0 op

ECTS Credits:

1 ECTS credits / 27 hours of work

Language of instruction:

Finnish

Timing:

Architecture 3. spring semester, period I; Biochemistry 3. autumn semester; Biology 3. autumn semester, period I; Chemistry 3. autumn semester, period II; Computer Science and Engineering 2. spring semester, period IV; Electronics and Communications Engineering 3. spring semester; Geosciences 2. spring semester, period IV; Geography 1. and 3. spring semester, period III; Industrial Engineering and Management 3. year (Master's degree students in Industrial Engineering and Management 1st year.); Information Processing Sciences 1. year; Mathematics and Physics 1. spring semester, period III; Mechanical Engineering 3. year; Mining Engineering and Mineral Processing 3. year; Process and Environmental Engineering 2. year, period II.

Learning outcomes:

Upon completion of the course, the students:
- can search scientific information,
- can use the most important databases of their discipline,
- know how to evaluate search results and information sources,
- can use the reference management tool

Contents:

Scientific information retrieval process, the most important databases and publication channels of the discipline, evaluation of the reliability of information sources and RefWorks reference management tool.

Mode of delivery:

Blended teaching: classroom training, web-based learning material and exercises, a group assignment.

Learning activities and teaching methods:

Training sessions 8 h, group working 7 h, self-study 12 h

Target group:

Compulsory for all bachelor degree students of Faculty of Information Technology and Electrical Engineering, Faculty of Technology and Faculty of Science. Compulsory also for those Master's degree students in Industrial Engineering and Management who have no earlier studies in the information skills. Optional for the students of biochemistry.

Prerequisites and co-requisites:

-

Recommended optional programme components:

-

Recommended or required reading:

Web learning material Tieteellisen tiedonhankinnan opas http://libguides.oulu.fi/tieteellinentiedonhankinta (in Finnish)

Assessment methods and criteria:

Passing the course requires participation in the training sessions and successful completion of the course assignments.

Grading:

pass/fail

Person responsible:

Ursula Heinikoski

Working life cooperation:

-

Other information:

-

Choose language studies

902150Y: Professional English for Technology, 2 op

Voimassaolo: 01.08.2014 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Leikkaavuudet:

902011P-05 TE3/ Professional English for Technology 2.0 op

Proficiency level:

CEFR B2 - C1

Status:

This course is the first English course for students in the engineering programmes in the Faculty of Technology (TTK) and Faculty of Information Technology and Electrical Engineering (TST).

Required proficiency level:

English must have been the A1 or A2 language at school or equivalent English skills acquired otherwise. If you need to take English, but lack this background, please get in touch with the Languages and Communication contact teacher for your department to discuss individual solutions.

ECTS Credits:

2 credits. The workload is 53 hours.

Language of instruction:

English

Timing:

The course takes place in the autumn semester (periods 1 and 2).

Learning outcomes:

By the end of the course, you can
- create and deliver effective presentations of a product, a company and company processes,
- apply appropriate cultural, linguistic and technical knowledge when presenting a product or company,
- evaluate your own strengths and weaknesses in English-language communication, with a view to developing appropriate skills in future.

Contents:

Scheduled as the first course of your English studies, Professional English for Technology (PET) has a strong focus on developing speaking skills necessary for working life. During PET, you will explore a product or service from your own field, and give a variety of short presentations in connection with your

product or service. In addition, PET helps you to develop an awareness of your own language skills, encouraging you to develop strategies and techniques for effective learning.

Mode of delivery:

Contact teaching and independent study

Learning activities and teaching methods:

Lessons 24 hours / independent work 29 hours. Lessons include regular pair and group work in class. Independent homework activities include team work for the preparation of four short presentations, vocabulary study and other small assignments. Active participation is essential.

Target group:

Students in the engineering programmes: TTK (PO1, YMP1, KO1, TuTa1, RaKy), TST (ST2, CSE2).

Prerequisites and co-requisites:

-

Recommended optional programme components:

This course is offered as the first course of your English studies.

Recommended or required reading:

Course materials will be provided by the teacher in electronic form.

Assessment methods and criteria:

The course utilises continuous assessment that is based on the learning outcomes of the course, including full and active participation in class, and the successful completion of module assignments and class presentations.
Lue lisää opintosuoritusten arvostelusta yliopiston verkkosivulta.

Grading:

pass / fail

Person responsible:

Each engineering programme has its own Languages and Communication contact teacher for questions about English studies.

Working life cooperation:

-

Other information:

-

902142Y: Business Correspondence, 2 op

Voimassaolo: 01.08.2014 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Proficiency level:

CEFR B2 - C1 (All Levels)

Status:

This course can be chosen in partial completion of the English language requirement for students in the engineering programmes in the Faculty of Technology (TTK) and Faculty of Information Technology and Electrical Engineering (TST).

Required proficiency level:

English must have been the A1 or A2 language at school or equivalent English skills acquired otherwise. If you need to take English, but lack this background, please get in touch with the Languages and Communication contact teacher for your department to discuss individual solutions.

ECTS Credits:

2 credits. The workload is 53 hours

Language of instruction:

English

Timing:

The course takes place in both autumn (periods 1 and 2) and spring (periods 3 and 4) semesters. Check the study guide for availability in your department.

Learning outcomes:

By the end of the course, you are expected to have demonstrated:

- the ability to write clear and effective business letters conveying information and details accurately,
- the ability to use an appropriate level of formality and style for business communications,
- mastery of the conventional formats and layouts of different types of business letters.

Contents:

The aim of this course is to introduce different types of business correspondence and the format used when communicating in writing. Types of correspondence include communication in business-to-business scenarios and between a business and the public.

Mode of delivery:

Self-access: the course operates within an online workspace, with online support from the teacher.

Learning activities and teaching methods:

Introductory session 2 hours / independent learning 51 hrs / optional text clinics. Assignments, instructions and course resources are available in the online course workspace. Completed assignments are submitted electronically to the teacher. The teacher provides feedback and any problems are discussed either by written electronic communication or at one of the optional text clinics.

Target group:

Students in the engineering programmes (TTK and TST)

Prerequisites and co-requisites:

-

Recommended optional programme components:

This is an elective course which can be taken after 902150Y PET by students in the engineering programmes (TTK, TST and OMS).

Recommended or required reading:

Course materials are provided in an electronic form that can be downloaded.

Assessment methods and criteria:

All assignments must be completed to a standard of effective business correspondence based on the learning outcomes of the course. In addition, there is a test at the end of the course.
Lue lisää opintosuoritusten arvostelusta yliopiston verkkosivulta.

Grading:

Pass/Fail

Person responsible:

See contact teachers

Working life cooperation:

-

Other information:

-

902145Y: Working Life Skills, 2 op

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Proficiency level:

CEFR B2 - C1 (All Levels)

Status:

This course can be chosen in partial completion of the English language requirement for students in the engineering programmes in the Faculty of Technology (TTK) and Faculty of Information Technology and Electrical Engineering (TST).

Required proficiency level:

English must have been the A1 or A2 language at school or equivalent English skills acquired otherwise. If you need to take English, but lack this background, please get in touch with the Languages and Communication teachers for your department to discuss individual solutions.

ECTS Credits:

2 ECTS credits. The workload is 53 hours.

Language of instruction:

English

Timing:

The course takes place in both autumn (periods 1 and 2) and spring (periods 3 and 4) semesters. Check the study guide for availability in your department.

Learning outcomes:

By the end of the course, you are expected to

1. have demonstrated a good basic vocabulary related to job applications, meetings and negotiations,
2. have demonstrated an ability to create an effective CV and cover letter for a job application,
3. be able to communicate effectively and with a reasonable degree of fluency at job interviews and in meeting and negotiation contexts.

Contents:

The aim of this course is to help you to develop the English language skills needed to deal with situations related to everyday working life. The course focuses on four basic areas:
i) business communication
ii) social and cultural aspects of English in working life situations,
iii) applying for a job,
iv) a general introduction to the language of meetings and negotiations.

Mode of delivery:

Contact teaching and independent study

Learning activities and teaching methods:

Lessons 26 hours / independent work 27 hours. Active participation is essential. The course includes regular pair and group work in class and independent homework activities.

Target group:

Students in the engineering programmes (TTK and TST).

Prerequisites and co-requisites:

-

Recommended optional programme components:

This is an elective course which can be taken after 902150Y PET by students in the engineering programmes (TTK and TST).

Recommended or required reading:

Course materials will be provided by the teacher in electronic form.

Assessment methods and criteria:

The course utilises continuous assessment that is based on the learning outcomes of the course. In addition, full and active participation is required, course assignments must be completed, and students must achieve a grade of 70% in two tests during the course. Students will be asked to take an end-of course exam if they have not otherwise demonstrated that they have achieved the learning outcomes by the end of the course.
Read more about assessment criteria at the University of Oulu webpage.

Grading:

Pass/Fail

Person responsible:

See contact teachers

Working life cooperation:

-

Other information:

-

902147Y: Academic Vocabulary for Science and Technology, 2 op

Opiskelumuoto: Language and Communication Studies
Laji: Course
Vastuuyksikkö: Languages and Communication
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: English

Proficiency level:

CEFR Level: B2-C1 (All levels)

Status:

This course can be chosen in partial completion of the English language requirement for students in the engineering programmes in the Faculty of Technology (TTK) and Faculty of Information Technology and Electrical Engineering (TST).

Required proficiency level:

English must have been the A1 or A2 language at school or equivalent English skills acquired otherwise. If you need to take English, but lack this background, please get in touch with the Languages and Communication contact teacher for your department to discuss individual solutions.

ECTS Credits:

2 ECTS credits. The workload is 53 hours.

Language of instruction:

English

Timing:

The course takes place in both autumn (periods 1 and 2) and spring (periods 3 and 4) semesters. Check the study guide for availability in your department.

Learning outcomes:

By the end of the course, you are expected to
1) explain and apply general academic / scientific vocabulary in Coxhead's Academic Word List (AWL)
2) differentiate between informal vs. formal / academic language,
3) demonstrate use of academic vocabulary in a variety of writing and communication contexts.

Contents:

The general aim of this course is to activate and broaden your basic scientific vocabulary, i.e. the core vocabulary of scientific texts, which is principally the same regardless of the field (AWL). During this process, you will become aware of the strategies which best promote your skills to learn and memorise vocabulary. The ultimate aim is to help you gain the skills to read and write academic / scientific text and to discuss related topics. To help you achieve the learning outcomes, you will work on many varied written and oral activities which focus primarily on practicing vocabulary learning strategies, word formation, and the use of the most frequent academic vocabulary (AWL sublists).

Mode of delivery:

Contact teaching and independent study

Learning activities and teaching methods:

Lessons 26 hours / independent work 27 hours. The independent work includes an essay; vocabulary tests; presentations, which will be given in class to small groups of students; and other homework assignments. Active participation is essential.

Target group:

Students in the engineering programmes (TTK and TST)

Prerequisites and co-requisites:

-

Recommended optional programme components:

This is an elective course which can be taken after 902150Y PET by students in the engineering programmes (TTK and TST).

Recommended or required reading:

Course materials will be provided by the teacher in electronic form.

Assessment methods and criteria:

Regular and active participation in the weekly sessions will be observed in continuous assessment that is based on the learning outcomes of the course. Satisfactory completion of the in-class/ homework assignments and the vocabulary tests is required.
Lue lisää opintosuoritusten arvostelusta yliopiston verkkosivulta.

Grading:

Pass/Fail

Person responsible:

See contact teachers

Working life cooperation:

-

Other information:

-

902121Y: Other Studies in English (level B2), 2 - 8 op

Voimassaolo: 01.08.2008 -
Opiskelumuoto: Language and Communication Studies
Laji: Course
Vastuuyksikkö: Languages and Communication
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: English
Voidaan suorittaa useasti: Kyllä

Ei opintojaksokuvauksia.

Choose your mother tongue

901044Y: Second Official Language (Swedish), Written Skills, 1 op

Voimassaolo: 01.08.2014 -
Opiskelumuoto: Language and Communication Studies
Laji: Course
Vastuuyksikkö: Languages and Communication
Opintokohteen kielet: Swedish
Leikkaavuudet:

901060Y	Second Official Language (Swedish), Written Skills	1.0 op

Proficiency level:

B1/B2/C1 (Common European Framework of Reference)

Status:

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

According to the requirements of the law, the student must be able to use Swedish both orally and in writing in various professional situations. Achieving this kind of proficiency during a course unit that lasts for only one semester requires that the student has already achieved the necessary starting proficiency level prior to taking the course.
This course includes also 901045Y Second Official Language (Swedish) Oral Skills, 1 ECTS credits.

Required proficiency level:

The required starting proficiency level for students of all faculties is a grade of 7 or higher from the Swedish studies at secondary school (B-syllabus) or equivalent knowledge AND a passing grade from the proficiency test held at the beginning of the course unit. Based on this proficiency test the students are directed to brush up on their language skills if it is deemed necessary; mastering basic vocabulary and grammar is a prerequisite to achieving the necessary language proficiency for the various communication situations one faces in professional life.
If a student has not completed Swedish studies (B-language) at secondary school with a grade of 7 or higher, or his/her language skills are otherwise lacking, he/she must achieve the required proficiency level BEFORE taking this compulsory Swedish course.

ECTS Credits:

2 ECTS credits

Language of instruction:

Swedish

Timing:

Studenst of Students of Industrial Engineering and Management : autumn semester of the 2nd year of studies
Students of Process Engineering and Environmental Engineering: autumn or spring semester of the second year of studies
Mechanical Engineering: autumn or spring semester of the third year of studies

Learning outcomes:

Upon completion of the course unit the student should be able to read and understand texts from his/her academic field and make conclusions based on them. The student should be able to write typical professional emails and short reports. He/she should be able to carry himself/herself according to Swedish etiquette when acting as host or guest. The student should also be able to discuss current events and special field-specific matters, use the vocabulary of education and plan and give short oral presentations relating to his/her own field.

Contents:

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

Mode of delivery:

Contact teaching

Learning activities and teaching methods:

1 x 90 minutes of contact teaching per week and self-directed study, 53 hours per course.

Target group:

See Timing

Prerequisites and co-requisites:

See Required Proficiency Level

Recommended optional programme components:

-

Recommended or required reading:

Study material will be provided by the teacher.

Assessment methods and criteria:

The course unit focuses on improving both oral and written language skills and requires active attendance and participation in exercises, which also require preparation time. 100% attendance is required. The course unit tests both oral and written language skills.
Read more about assessment criteria at the University of Oulu webpage.

Grading:

Oral and written language proficiencies are tested separately and assessed using the so called KORU-criteria (publication of HAMK University of Applied Sciences, 2006). Separate grades will be awarded for the successful completions of both oral and written portions of the course unit: the possible passing grades are **satisfactory skills and good skills** (see language decree 481/03). The grades are based on continuous assessment and testing.

Person responsible:

See contact teachers on the Language and Communication home page http://www.oulu.fi/languagesandcommunication/student_counselling

Working life cooperation:

-

Other information:

Students sign up for teaching in WebOodi. Sign up only to a course 901044Y Second Official Language (Swedish) Written Skills, 1 ECTS credits.
A student can only sign up for one teaching group. When signing up , it is imperative that the student fills in his/her university email address (paju.oulu.fi), major subject and Swedish grades attained during secondary education in the Further Information field. Information in sign-up periods and course unit timetables can be found in WebOodi.

901045Y: Second Official Language (Swedish), Oral Skills, 1 op

Voimassaolo: 01.08.2014 -
Opiskelumuoto: Language and Communication Studies
Laji: Course
Vastuuyksikkö: Languages and Communication
Opintokohteen kielet: Swedish
Leikkaavuudet:

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

900081Y: Second Official Language (Finnish), Written Skills, 1 - 2 op

Voimassaolo: 01.01.2015 -
Opiskelumuoto: Language and Communication Studies
Laji: Course
Vastuuyksikkö: Languages and Communication
Opintokohteen kielet: Finnish

900082Y: Second Official Language (Finnish), Oral Skills, 1 - 3 op

Voimassaolo: 01.01.2015 -
Opiskelumuoto: Language and Communication Studies
Laji: Course
Vastuuyksikkö: Languages and Communication
Opintokohteen kielet: Finnish

A485124: Civil Engineering, Intermediate Studies, 60 op

Voimassaolo: 01.08.2018 -
Opiskelumuoto: Intermediate Studies
Laji: Study module

Vastuuyksikkö: Civil Engineering field
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

Intermediate Studies

485101A: Introduction to building construction, 5 op

Voimassaolo: 01.08.2019 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Civil Engineering field
Arvostelu: 1 - 5, pass, fail
Opettajat: Liedes, Hannu Tapani
Opintokohteen kielet: Finnish
Leikkaavuudet:

466101A Introduction to building construction 5.0 op
460116A-01 Introduction to Contruction Engineering, examination 0.0 op
460116A-02 Introduction to Contruction Engineering, exercise work 0.0 op
460116A Introduction to Building Construction 3.0 op

ECTS Credits:

5 ECTS credits / 132 hours of work

Language of instruction:

Finnish

Timing:

Spring, periods 3-4

Learning outcomes:

After completing the course students can describe the construction process, different parties of a construction project and their role in the project. Students can also explain how laws and legislation affects the construction, design and production of building structures. They can describe the material properties of the most common construction materials. They can also explain the certification process of a building material or product and the environmental legislation in construction.

Contents:

The following topics are covered during the course: Construction law and legislation. Different phases of a construction project. The raw materials, production and properties of the most common construction materials and products. Quality assurance and certification of building products. Environmental declarations. Life cycle assessment.

Mode of delivery:

Lecture room teaching.

Learning activities and teaching methods:

Lectures and exercises

Target group:

Students studying structural engineering

Recommended or required reading:

Lecture material. Land use and building legislation. The National Building Code of Finland

Assessment methods and criteria:

Passed practical works and exam

Grading:

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

Person responsible:

University teacher Hannu Liedes

Other information:

This course will replace course 466101A Talonrakennuksen perusteet in Academic year 2020-21.

461105A: Technical thermodynamics, 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:

461035A Heat and Mass Transfer I 3.5 op

ECTS Credits:

5 ETCS / 120 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 2nd autumn semester.

Learning outcomes:

After the course, the student can explain the principal laws of thermodynamics and their impact on energy conversions. He/she can apply the energy balance equations for closed and open systems in the calculation of properties and path functions of different processes. The student can explain the theoretical foundations of combustion engines, gas and vapor power plants, and refrigerators and heat pumps. In addition, he/she can solve problems regarding fluid flow in pipes and heat and moisture transfer.

Contents:

Heat and moisture transfer and fluid flow in pipes; Principal laws in thermodynamics and basic concepts involved; Applications in production, transformation, transfer and use of energy.

Mode of delivery:

Implemented as Face-to-face -teaching.

Learning activities and teaching methods:

Lectures 30 h / exercises 30 h / independent work of solving homework problems 60 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:

Cengel, Y.A. & Boles, M.A., Thermodynamics; An Engineering Approach, Fifth edition in SI-units, 2006; Cengel, Y.A., Heat Transfer; A Practical Approach, Second edition, 2003.

Assessment methods and criteria:

The course is passed by midterm exams or by a final exam. During the course two midterm exams are arranged. Every week exercises are organized, and part of the exercise problems are left for independent work.

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 fundamental information of thermodynamics and its applications.

485103A: Building physics, 5 op

Voimassaolo: 01.08.2019 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Civil Engineering field
Arvostelu: 1 - 5, pass, fail
Opettajat: Filip Fedorik
Opintokohteen kielet: English
Leikkaavuudet:

466111S Building physics 5.0 op
460160S-01 Building Physics, examination 0.0 op
460160S-02 Building Physics, exercises 0.0 op
460160S Building Physics 3.5 op

ECTS Credits:

5 ECTS credits / 132 hours of work

Language of instruction:

English

Timing:

Autumn, Periods 1-2

Learning outcomes:

After completing the course the student can explain basic phenomenon of building physics. The student can analyse and describe heat, air and moisture transfer in buildings and also explain main causes of typical moisture damages. The student can explain factors affecting energy efficiency and can calculate the energy efficiency number. The student knows the calculation methods in acoustics.

Contents:

Thermal isolation design. Determination of structure temperature. Moisture transfer and moisture exiting. Airflows in structures. Energy efficiency in buildings. Acoustic design.

Mode of delivery:

Face-to-face and distance learning

Learning activities and teaching methods:

Lectures, excercises, case studies, and self directed learning

Target group:

Students studying structural engineering

Prerequisites and co-requisites:

466101A Introduction to building construction

Recommended or required reading:

The material that is in English will be distributed at the lectures
1) Lecture notes (mainly in Finnish)
2) Suomen rakentamismääräyskokoelman osatC1, C2, C3, C4 ja D3.
3) Introduction to Building Physics, Hagentoft, C.-E. (2001), ISBN 91-44-01896-7, (As specified in lectures).

Assessment methods and criteria:

Excercises and exam

Grading:

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

Person responsible:

university lecturer Raimo Hannila

Other information:

This course will replace course 466111S Building Physics in Academic year 2020-21.

485022A: Fundamentals of built environment, 5 op

Voimassaolo: 01.08.2019 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Civil Engineering field
Arvostelu: 1 - 5, pass, fail
Opettajat: Liedes, Hannu Tapani
Opintokohteen kielet: Finnish
Leikkaavuudet:

454541A	Built Environment	5.0 op
488142A	Environmental legislation and EIA	5.0 op

ECTS Credits:

5 cr

Language of instruction:

Finnish

Timing:

This is new course, which will teach firs time in Academic Year 2020-21.

485301A: Basics of Geotechnics, 5 op

Voimassaolo: 01.08.2019 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Civil Engineering field
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 133 hours of work

Language of instruction:

English and Finnish

Timing:

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

Learning outcomes:

Upon completion this course, the student will understand the fundamental of Soil mechanics, foundation engineering and soil freezing and thawing.

Contents:

Origins and composition of soils, classification of soils, stress and strains in soils, mechanical properties of soils, stability of slopes, bearing capacity of foundation, seepage analyses, freezing and thawing of soils, site investigations and in situ testing.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures (30 h) and calculation exercises (30 h) also independent work (73 h)

Target group:

Students in Bachelor and Master programs of environmental engineering and civil engineering

Prerequisites and co-requisites:

No

Recommended optional programme components:

-

Recommended or required reading:

Lecture handout and other materials delivered in lectures, Principles of Geotechnical Engineering by Das, B.M and An Introduction to Geotechnical Engineering, By Holtz, R.D. and Kovacs, W.D.

Assessment methods and criteria:

Examination
Read more about assessment criteria at the University of Oulu webpage.

Grading:

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

Person responsible:

Anne Tuomela

Working life cooperation:

No

Other information:

Lectures are mostly in English and exercises mostly in Finnish but the student can complete the course using both languages.
This course will replace course 488115A Geomechanics in Academic year 2020-21.

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

ECTS Credits:

5 cr

Language of instruction:

Finnish

Timing:

This course will replace course 488129S in Academic year 2020-21.

Person responsible:

Anne Tuomela

485201A: Building information modeling and CAD, 5 op

Voimassaolo: 01.08.2019 -
Opiskelumuoto: Intermediate Studies
Laji: Course

Vastuuyksikkö: Civil Engineering field

Arvostelu: 1 - 5, pass, fail

Opettajat: Antti Niemi

Opintokohteen kielet: Finnish

ECTS Credits:

5 ETCS / 135 hours of work

Language of instruction:

Finnish

Timing:

The course is held in the spring semester, during period 4.

Learning outcomes:

Upon completion of the course, student will know the basics of computer-aided modeling and design. The course enables application and development of modeling and design applications and further development as an independent user of various modeling systems and platforms.

Contents:

Principles of geometric and data modeling. Representation of curves and surfaces. Properties of CAD and modelling applications and exercises. Basic algorithms related to geometric and data modelling.

Mode of delivery:

Face-to-face and independent study

Learning activities and teaching methods:

Lectures and exercises 30 h, independent study and project work 105 h

Target group:

Bachelor level students in the degree program of civil engineering

Prerequisites and co-requisites:

Basic course in mathematics

Recommended optional programme components:

The course supports advanced courses in civil engineering

Recommended or required reading:

Lecture and exercise material

Assessment methods and criteria:

Continuous assessment of exercise work and home work

Person responsible:

Antti H. Niemi ja Pekka Rossi

485023A: GIs and geoinformatics, 5 op

Voimassaolo: 01.08.2019 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Civil Engineering field

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

5 cr

Language of instruction:

Finnish

Timing:

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

Learning outcomes:

After completion the student understands the basics of spatial data and geographical information systems (GIS) including especially the most important coordinate systems, map projections, Finnish map coordinates and satellite positioning, and knows how to visualize spatial data in various ways.

Contents:

The course provides basic information about the presentation and handling of spatially dependent geoscientific data and geographic information systems (GIS). The course considers the basics of spatial data, coordinate systems, map projections and map coordinates, satellite positioning, processing and visualization of spatial data. Computer exercises demonstrate preparation and visualization of geoscientific data in practice.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures and exercises totaling 40 h plus independent study 95 h.

Target group:

Bachelor students in civil engineering

Prerequisites and co-requisites:

No specific prerequisites.

Recommended or required reading:

Lecture handout and other materials delivered in lectures

Assessment methods and criteria:

Examination and computer test.

Grading:

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

Person responsible:

Anssi Rauhala

Working life cooperation:

No

485102A: Introduction to structural design, 5 op

Voimassaolo: 01.08.2019 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Civil Engineering field
Arvostelu: 1 - 5, pass, fail
Opettajat: Liedes, Hannu Tapani
Opintokohteen kielet: Finnish
Leikkaavuudet:

466102A	Introduction to structural design	3.0 op
460117A-01	Introduction to Structural Design, examination	0.0 op
460117A-02	Introduction to Structural Design, exercise work	0.0 op
460117A	Introduction to Structural Design	6.0 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 name technical regulations and instructions, which guide construction. After completing the course students can explicate principle of verifications and plastic theory on structure design and also different loads on structure. Student estimate design loads by calculation and design load effect in structures. Student can describe different structure and bracing systems.

Contents:

Regulations and supervising. The principle of design verification. The loads and effect. The principle of using of eurocode. The principle of plastic theory on on structure design. Structure systems. The joints of structures.

Mode of delivery:

Lecture room teaching

Learning activities and teaching methods:

Lectures and exercises

Target group:

Bachekor studying

Prerequisites and co-requisites:

461016A Statics and 460101A Strength of Materials I

Recommended or required reading:

Lecture notes (mainly in Finnish), Finnish law and legislation, National building code of Finland, Eurocode standards

Assessment methods and criteria:

Passed practical works and exam

Grading:

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

Person responsible:

University teacher Hannu Liedes

Other information:

This course will replace course 466102A Rakennesuunnittelun perusteet in Academic year 2020-21.

485105A: Concrete technology, 5 op

Voimassaolo: 01.08.2019 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Civil Engineering field

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

466109S	Concrete technology	5.0 op
460155S-01	Concrete Technology, examination	0.0 op
460155S-02	Concrete Technology, laboratory exercise	0.0 op
460155S	Concrete Technology	4.5 op

ECTS Credits:

5 ECTS credits / 132 hours of work

Language of instruction:

Finnish

Timing:

Spring semester, periods 3-4

Learning outcomes:

After completing the course the student is able to specify concrete and the materials from which it is made. They can design normal concrete mixes and identify, describe and carry out the main laboratory tests relevant to the use of concrete on site.

Contents:

Cements and cementitious materials, aggregates for concrete, concrete mix design, properties of fresh and hardened concrete, laboratory tests, specification testing and compliance, environmental exposure classes.

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:

466101A Introduction to building construction

Recommended optional programme components:

466101A Introduction to building construction

Recommended or required reading:

The material that is in English will be distributed at the lectures.
1) Lecture notes (mainly in Finnish),
2) Järvinen, Maarit. 2004. Betonitekniikan oppikirja : BY 201. Helsinki : Suomen Betonitieto.;
3) Suomen betoniyhdistys. Betoninormit 2004: BY 50. Helsinki : Suomen betonitieto;
4) Suomen Standardisoimisliitto ry. SFS-Standardisointi:
5) SFS-EN Standards

Assessment methods and criteria:

Passed laboratory excercises and exam

Grading:

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

Person responsible:

Jorma Hopia

Other information:

This course will replace course 466109S in Academic year 2020-21.

485106A: Design of concrete structures, 5 op

Voimassaolo: 01.08.2019 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Civil Engineering field
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish
Leikkaavuudet:

466107S	Design of concrete structures	6.0 op
460147A	Introduction to Design of Concrete Technology	4.0 op
460147A-01	Introduction to Design of Concrete Technology, examination	0.0 op
460147A-02	Introduction to Design of Concrete Technology, exercise work	0.0 op
460148S	Design of Concrete Structures	4.0 op
460148S-01	Design of Concrete Structures I, examination	0.0 op
460148S-02	Design of Concrete Structures I, exercises	0.0 op

ECTS Credits:

5 ects

Language of instruction:

Finnish

Timing:

Lectures and exercising on periods 3 and 4.

Learning outcomes:

Upon completion of the course, the student will be able to design typical reinforced concrete structures to EN-standards.

Contents:

Strength and strain properties of concrete and reinforcing bars, time dependent properties. Limit state design of concrete beams and columns to EN standards. Service life design. Fire design. Anchoring and joints of reinforcing bars. Design of flanged cross sections, walls and wall like beams, and foundations carrying walls and columns.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

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

Target group:

Bachelor level students in the degree program of civil engineering

Prerequisites and co-requisites:

Basic knowledge of statics, solid mechanics, concrete technology and structural engineering

Recommended or required reading:

Nykyri: by 211 Betonirakenteiden suunnittelun oppikirja, osa 1, 2013 ja osa 2, 2014; Leskelä: by 210 Betonirakenteiden suunnittelu ja mitoitus 2008; EN 1992-1-1, EN 1992-1-2 ja muut EN-standardit soveltuvin osin; by 51 Betonirakenteiden käyttöikäsuunnittelu 2007; by 47 Betonirakentamisen laatuohjeet 2007; RIL 229-2-2006 Rakennesuunnittelun asiakirjaohje, Mallipiirustukset ja -laskelmat; RIL 202-2011/BY 61-2011 Betonirakenteiden suunnitteluohje; Martin, Purkiss: Concrete Design to EN 1992, Elsevier, 2nd ed. 2006. Materials from lectures and exercises.

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:

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

Person responsible:

Senior recearsh fellow Antti H. Niemi

Other information:

This course will replace course 466107S Design of concrete structures in Academic year 2020-21.

485001A: Practical Training, 5 op

Voimassaolo: 01.08.2019 -

Opiskelumuoto: Intermediate Studies

Laji: Practical training

Vastuuyksikkö: Civil Engineering field

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS, 3 months working full-time

Language of instruction:

Finnish or English

Timing:

Student usually works in summer time.

Learning outcomes:

During the practical training the student is exposed to his/her working environment from the point of view of his/her studies and becomes acquainted with one of a possible future job. The student can identify the problems associated with the working environment and can propose improvements to them. The student will experience points of contact between working life and studies.

Target group:

Bachelor students of Civil Engineering

Assessment methods and criteria:

Student has to show original references and leave the application and report to tutor teacher. In reference must be training time period and duties.

Grading:

Verbal scale Passed/Failed

Person responsible:

Saara Luhtaanmäki

Working life cooperation:

Yes

A485121: Civil Engineering, Module preparing for the Option / Geo Engineering, 40 op

Voimassaolo: 01.08.2018 -
Opiskelumuoto: Intermediate Studies
Laji: Study module
Vastuuyksikkö: Civil Engineering field
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

Geo Engineering

477052A: Fluid Mechanics, 5 op

Voimassaolo: 01.08.2015 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Field of Process and Environmental Engineering
Arvostelu: 1 - 5, pass, fail
Opettajat: Ainassaari, Kaisu Maritta
Opintokohteen kielet: Finnish
Leikkaavuudet:

477301A	Momentum Transfer	3.0 op

ECTS Credits:

5 ECTS / 133 hours of work.

Language of instruction:

Finnish, can be completed in English as a book examination.

Timing:

Implementation in spring semester during 3 rd period. It is recommended to complete the course at the second (Bachelolor's) spring semester.

Learning outcomes:

After the course the student is able to determine the viscosity of pure substances and mixtures and to estimate the effect of temperature and pressure on viscosity. The student is able to recognise the interactions between a solid body and flowing fluid and to distinguish the forces, their directions and to calculate their magnitudes. The student is able to formulate momentum balance equations and to solve these in order to calculate velocity distribution, flow rate and pressure drop. The student is able to distinguish laminar and turbulent flow regimes from others and is able to use the correct equations according to flow regime. After the course the student is able to design pipelines and other simple flow mechanical process equipment.

Contents:

Viscosity. Mechanism of momentum transfer. Creating and solving differential momentum balances. Friction factor. Macroscopic balances. Flow in pipes and open-channels.

Mode of delivery:

Face-to-face teaching in Finnish. Book examination in English.

Learning activities and teaching methods:

Lectures 45 h, homework 15 h and self-study 73 h. For foreign students written examination based on given literature.

Target group:

Bachelor's degree students of process and environmental engineering.

Prerequisites and co-requisites:

Knowledge of solving differential equations.

Recommended optional programme components:

The course is part of a stream that aims at skills needed in the phenomenon-based modelling and planning of industrial processes.

Recommended or required reading:

Munson, B.R., Young, D.F. & Okiishi, T.H. Fundamentals of Fluid Mechanics.

Assessment methods and criteria:

This course utilizes continuous assessment. During the course there are 5 intermediate exams. The course can also be completed by final examination. Read more about the course assessment and grading systems of the University of Oulu at www.oulu.fi/english/studying/assessment.

Grading:

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

Person responsible:

University teacher Kaisu Ainassaari

Working life cooperation:

No

Other information:

-

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 rela-tion 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 solev in the lectures based on real problems

Other information:

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

488144A: Water distribution and sewage networks, 5 op

Voimassaolo: 01.08.2019 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Process and Environmental Engineering

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Leikkaavuudet:

488135S Water distribution and sewage networks 5.0 op

ECTS Credits:

5 ECTS credits/133 hours of work

Language of instruction:

English

Timing:

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

Learning outcomes:

Student knows and understands the systems and dynamics needed for water distribution and waste water networks. Student is able to do basic dimensioning for water distribution network and sewer system of an urban area.

Contents:

Water distribution and waste water network design and dimensioning, Pumping and storage tanks needed in distribution of water and collection of sewage waters, renovation of pipelines, special circumstances in water distribution, effects of cold climate and harmful hydraulic conditions.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures (30 h), homework (45 h) and a design exercise (58 h).

Target group:

Students in master program of environmental engineering and in master program of civil engineering.

Prerequisites and co-requisites:

Use of AutoCAD-program

Recommended optional programme components:

The recommended prerequisite is the completion of the following course prior to enrolling for the course unit: 477052A Virtaustekniikka, 477312A Lämmön- ja aineensiirto 488102A Hydrological Processes and 488051A AutoCAD ja Matlab prosessi- ja ympäristötekniikan työkaluna or at least equivalent information about water management.

Recommended or required reading:

Lecture handout and other materials delivered in lectures. To the appropriate extent: RIL 237-1-2010 Vesihuoltoverkkojen suunnittelu, RIL 237-2-2010 Vesihuoltoverkkojen suunnittelu, RIL 124-2 Vesihuolto II, Mays Water distribution systems handbook

Assessment methods and criteria:

Exam and a design exercise.

Grading:

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

Person responsible:

Postdoctoral Researcher Pekka Rossi

Working life cooperation:

Visit to a site of water distribution network buiding site, pumping station or water supply/sewerage company.

Other information:

Replaces the course 488135S.

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 /133 hours of work

Language of instruction:

English

Timing:

3rd year 3rd period

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

Working life cooperation:

No

Other information:

-

485401A: Basics of Traffic Engineering, 5 op

Voimassaolo: 01.08.2019 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Civil Engineering field

Arvostelu: 1 - 5, pass, fail

Opettajat: Virve Merisalo

Opintokohteen kielet: Finnish

Leikkaavuudet:

488151A Basics of Traffic Engineering 5.0 op

ECTS Credits:

5 ECTS / 133 h of work

Language of instruction:

Finnish

Timing:

Period 1

Learning outcomes:

By completing the course the student knows the basics of modes of transport, the significance of traffic and transportation to society, traffic planning and research methods, transport economics and the external effects of transport.

Contents:

Modes of transport, Need for traffic and transportation, Transport planning and research, Economical and environmental impacts of traffic, Traffic safety.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 28 h, exercises 22 h, self-study 85 h

Target group:

Students in the Master's Programmes of environmental engineering and mechanical engineering

Prerequisites and co-requisites:

-

Recommended optional programme components:

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

Recommended or required reading:

Materials delivered during the lectures

Assessment methods and criteria:

Examination 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 Virve Merisalo

Working life cooperation:

No

Other information:

This course will replace course 488151A Basics of Traffic Engineering in Academic year 2019-20.

485403A: Basics of Road Engineering, 5 op

Voimassaolo: 01.08.2019 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Civil Engineering field
Arvostelu: 1 - 5, pass, fail
Opettajat: Veikko Pekkala
Opintokohteen kielet: Finnish
Leikkaavuudet:

488153A Basics of Road Engineering 5.0 op

ECTS Credits:

5 ECTS / 133 h of work

Language of instruction:

Finnish

Timing:

Period 3

Learning outcomes:

By completing the course the student understands the basics of road design and construction, is able to calculate structure layers of road and is familiar with the maintenance of roads

Contents:

Road and street planning and design, lining, roads structure, maintenance of roads, basics of earthworks

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 28 h, exercises 22 h, self-study 85 h

Target group:

Students in master's programmes of environmental engineering and mechanical engineering

Prerequisites and co-requisites:

-

Recommended optional programme components:

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

Recommended or required reading:

Materials delivered during the lectures

Assessment methods and criteria:

Materials delivered during the lectures

Grading:

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

Person responsible:

Veikko Pekkala

Other information:

This course will replace course 488153A Basics of Road Engineering in Academic year 2019-20.

488505A: Waste managemet and recycling, 5 op

Voimassaolo: 01.09.2018 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Process and Environmental Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Jenni Ylä-Mella, Eva Pongracz

Opintokohteen kielet: Finnish

Leikkaavuudet:

488130A Waste management and resources recovery 5.0 op

ECTS Credits:

5 ECTS / 135 hours of work

Language of instruction:

Finnish

Timing:

Autumn, period 1. Preferred time is the 2nd year

Learning outcomes:

After completing the course, the student will be familiar with the waste legislation and other policy instruments and is able to use the waste-related terminology. The student understands the responsibilities of the different actors and stakeholders in the municipal waste management system and knows the key waste minimization and recycling requirements. The student will also be able to plan and scale the municipal waste collection system for the households and to calculate the recycling and recovery rates of recyclables that must be achieved. The student knows the key recycling technologies for the main waste fractions and can calculate treatment costs for the major streams.

Contents:

Waste legislation in the EU and Finland. Waste Act and Regulations, waste hierarchy. Sorting of household waste: waste containers, collection points, transport and reception, responsibilities. Waste recycling and energy recovery technologies, recycling rates, producer responsibility schemes, utilization of bio-waste and energy recovery technologies. Waste Center operations, safe disposal of waste. Consumer habits, consumers responsibilities and future challenges in waste management.

Mode of delivery:

Face-to-face teaching, exercises and group works, company visits. The course has compulsory participation requirements.

Learning activities and teaching methods:

Lectures 30 h, exercises and group work 45 h, company visits 8 h, individual work 50 h.

Target group:

Bachelor’s students in process and environmental engineering, other minor subject students.

Recommended or required reading:

Lecture slides and information on recommended reading material will be provided during the course.

Assessment methods and criteria:

Continuous evaluation. Personal weekly assignments, exercises and group work during the course. Participating of at least 50 % of lectures and answering of at least 80% of weekly assignments are compulsory. Personal weekly assignments can be replaced with a final exam but one exercise, a group work and one company visit are always mandatory.

Grading:

The evaluation is based on personal weekly assignments (or exam), exercises and group work during the course. The scores obtained from assignments forms the final grade. The course uses a numerical grading Scale 1-5. In the numerical scale, zero stands for a fail.

Person responsible:

D.Sc.(Tech.) Jenni Ylä-Mella

Other information:
This course replaces course 488130A Waste management and resources recovery.

485303A: Soil Mechanics, 5 op

Voimassaolo: 01.08.2019 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Civil Engineering field
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

ECTS Credits:
5 cr
Language of instruction:
Finnish
Timing:
This is new course, which will teach first time in Academic Year 2020-21.

A485122: Civil Engineering, Module preparing for the Option / Structural Engineering, 40 op

Voimassaolo: 01.08.2018 -
Opiskelumuoto: Intermediate Studies
Laji: Study module
Vastuuyksikkö: Civil Engineering field
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

Structural Engineering

461104A: Strength of materials II, 5 op

Voimassaolo: 01.08.2015 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Field of Mechanical Engineering
Arvostelu: 1 - 5, pass, fail
Opettajat: Laukkanen, Jari Jussi
Opintokohteen kielet: Finnish
Leikkaavuudet:

461011A-01	Strength of Materials II, examination	0.0 op
461011A-02	Strength of Materials II, exercises	0.0 op
461011A	Strength of Materials II	7.0 op

ECTS Credits:
5 ECTS
Language of instruction:
Finnish
Timing:
Periods 1-2.

Learning outcomes:

The student can apply fatigue design principles in structural analysis and use fracture mechanics to evaluate the life of simple structures. He / she is also able to solve stability, buckling and buckling bending of rod and beam structures. The student is able to solve curve beam bending state and free and prevented torque situations.

Contents:

Dimensioning of structures for fatigue. Elements of fracture mechanics. Stability, buckling and buckling of rod and beam structures. Curve bar bending. Free and prevented torsion.

Mode of delivery:

Contact teaching

Learning activities and teaching methods:

Lectures 45 h, exercises 45 h and intependent learning 45 h. Homework.

Target group:

Compulsory for Mechanical Engineering Degree students.

Prerequisites and co-requisites:

Statics and Strenght Theory I.

Recommended or required reading:

Pennala, E.: Lujuusopin perusteet, Moniste 407, Otatieto, 1998; Outinen, H., Koski, J., Salmi, T.: Lujuusopin perusteet, Pressus Oy, Tampere, 2000 ;Salmi, T., Virtanen, S.: Materiaalien mekaniikka, Pressus Oy, Tampere, 2008; Ylinen, A.:Kimmo- ja lujuusoppi I ja II. WSOY, 1976;. Bära brista, grundkurs i hållfasthetslära, AWE/Gebers, Stockholm 1979.

Assessment methods and criteria:

The course can be completed with an intermediate exam or a final exam. You can take the exam only after you have successfully completed your homework.

Grading:

The course uses 1-5 numerical grading scale. On a numerical scale, zero indicates a failed performance.

Person responsible:

University Teacher Jari Laukkanen.

Other information:

After completing the course, the student will have a general understanding of the different areas of strength and will be able to discuss the potential of strength design with experts in the field.

461106A: Dynamics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Mechanical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Koivurova Hannu

Opintokohteen kielet: Finnish

Leikkaavuudet:

461018A-01	Dynamics, examination	0.0 op
461018A-02	Dynamics, exercises	0.0 op
461018A	Dynamics	4.0 op

ECTS Credits:

5 ECTS credits / 120 hours of work

Language of instruction:

Finnish

Timing:

The course is held in the spring semester, during periods 3 and 4. It is recommended to complete the course at the 2st spring semester.

Learning outcomes:

The aim of this course is to provide students with the ability to examine the relationship between the forces on a solid body and the resulting motion, position, speed and acceleration of the body. Learning outcomes: Upon completing the required coursework, the student knows and is able to explain the fundamental quantities and the base laws of the classical mechanics. He/she is able to choose an appropriate coordinate system and analyze the motion - position, velocity, and acceleration - of the parts of a device. The student is able to draw a free body diagram of a moving system, and compose and derive the equations of motion for a system using the direct momentum method, the work-energy method, and the impulse-momentum method.

Contents:

Introduction; Kinematics of a particle; Plane kinematics of a rigid body; Kinetics of a particl;. Basics of mechanical vibrations; Kinetics of a system of particles; Plane kinetics of a rigid body.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 45 h / Exercise 30 h / Self-study 45 h.

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. (2003) Dynamiikka 1, kinematiikka, Pressus; Salmi, T. (2002) Dynamiikka 2, kinetiikka, 2. p., Pressus. Oheiskirjallisuus: Salonen, E.M. (2000) Dynamiikka I, 8. korj. p., Otatieto; Salonen, E.M. (1999) Dynamiikka II, 8. korj. p., Otatieto; Beer, F., Johnston, E.(2007) Vector Mechanics for Dynamics, 9.ed., McGraw-Hill

Assessment methods and criteria:

This course utilizes continuous assessment. During the course, there are three intermediate exams. In addition to this, the students will be asked to calculate homeworks, and theses homeworks will be assessed. The assessment of the course is based on the learning outcomes of the course. The more detailed assessment criteria are available on the Optima Study Portal.

Grading:

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

Person responsible:

University Lecturer Hannu Koivurova

461108A: Mechanics of materials, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Mechanical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Koivurova Hannu

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 90 hours of work

Language of instruction:

Finnish

Timing:

The course is held in the autumn semester, during periods 1 and 2. It is recommended to complete the course at the 3rd autumn semester.

Learning outcomes:

Upon completing the required coursework, the student knows the theoretical background of the strength of materials and he/she is able to apply the theory of the strength of materials to different kind of design problems needed in engineering mechanics. He/she understand the fundamental concepts of mechanics of deformable solids; including static equilibrium, geometry of deformation, and material constitutive behavior. He/she can discuss the basic mechanical principles underlying modern approaches for modelling of various types of materials under a different type of loadings. This provide students with exposure to the systematic methods for solving engineering problems in solid mechanics. He/she can also build the necessary theoretical background for further structural analysis and design courses.

Contents:

The general equations of mechanics. The stress and strain state. Different material models; Linear elastic material, isotropic, transverse-isotropic and orthotropic material models. The concept of strain energy. Theory of plasticity. Yield criterion, plastic flow rule and hardening. Limit state design. Introduction to visco elastic material and creep teory.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 30 h / Exercise 30 h / Self-study 30 h.

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., Virtanen, S. (2008) Materiaalien Mekaniikka. Pressus Oy.

Assessment methods and criteria:

This course utilizes continuous assessment. During the course, there are three intermediate exams. In addition to this, the students will be asked to calculate homeworks, and theses homeworks will be assessed. The assessment of the course is based on the learning outcomes of the course. The more detailed assessment criteria are available on the Optima Study Portal.

Grading:

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

Person responsible:

University Lecturer Hannu Koivurova

461107A: Finite Element Methods I, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Mechanical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Lumijärvi, Jouko Veikko Juhani

Opintokohteen kielet: Finnish

Leikkaavuudet:

461033A	Finite Element Methods I	3.5 op
461033A-01	Finite Element Methods I, examination	0.0 op
461033A-02	Finite Element Methods I, exercises	0.0 op

ECTS Credits:

5 ECTS credits / 132 hours of work

Language of instruction:

Finnish

Timing:

Lectures and exercises, periods 1. - 2.

Learning outcomes:

The aim of this course is for students to gain an understanding of the basic idea and restrictions of FEM. After this course, the student can explain the basic idea of the FEM. He/she can analyze simple truss-, frame- and plane structures and explain the theoretical background of the calculations.

Contents:

The basic idea of FEM and its use in static analyses of bars, beams and plane structures. Some general principles of the use of FEM.

Mode of delivery:

Face-to-face teaching.

Learning activities and teaching methods:

Lectures and exercises take place during periods 1.-2. The course can be passed either by completing two midterm exams or a final exam.

Prerequisites and co-requisites:

Strength of Materials I and II.

Recommended or required reading:

Lecture notes (in Finnish), N. Ottosen & H. Petersson: Introduction to the Finite Element Method, NAFEMS: A Finite Element Primer, O. C. Zienkiewcz & R. L. Taylor: The Finite Element Method, 4th ed, Vol. 1: Basic Formulation and Linear Problems.

Assessment methods and criteria:

The grade of the course is based on midterm exams or a final exam. The student must pass the exercises before taking the examination.

Grading:

Numerical grading scale 1-5.

Person responsible:

Jouko Lumijärvi

485107A: Timber construction and product technology, 5 op

Voimassaolo: 01.08.2019 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Civil Engineering field
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

ECTS Credits:

5 cr

Language of instruction:

Finnish

Timing:

This is new course, which will teach first time in Academic Year 2020-21.

485110A: Timber product technology and construction, 5 op

Voimassaolo: 01.08.2019 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Civil Engineering field
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

ECTS Credits:

5 ETCS / 135 hours of work

Language of instruction:

Finnish

Timing:

The course is held in the spring semester, during periods 3 and 4

Learning outcomes:

Ability to design and dimension conventional load-bearing structures made of wood according to the requirements of the EN standard.

Contents:

Mechanical properties of wooden materials. Design of columns and beams. Stability. Phenomena in joints and connections. Design of connections.

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:

Bachelor level students in the degree program of civil engineering

Prerequisites and co-requisites:

Basic knowledge of statics, solid mechanics, timber construction and product technology as well as structural engineering

Recommended optional programme components:

The course supports advanced courses in civil and structural engineering and timber structures

Recommended or required reading:

RIL 201; RIL 205 + Puurakenteiden lyhennetty suunnitteluohje; EN 1995-1-1, EN 1995-1-2, EN 1995-2. Material from Puuinfo

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:

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

Person responsible:

Senior research fellow Antti H Niemi

485108A: Desing of Steel Structures and Steel Construction, 5 op

Voimassaolo: 01.08.2019 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Civil Engineering field

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

5 ects

Language of instruction:

Finnish

Timing:

Periods 1 and 2

Learning outcomes:

After completing the course the student is capable of explaining the crystalline structure of steel material and he understands elasto-plastic material model. He is able to explain the effect of inclusions, heat treatment and welding process to the mechanical properties of a steel material. The student is familiar with fire design of steel structures. He is able to explain common types of corrosion. The student is able to design the most typical joints in a steel frame and he can analyze simple steel structures. He is also able to analyze stability problems and explain the effects of imperfections and second order effects on frame behavior and member forces.

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, exercises and self-study.

Target group:

Major students in Structural Engineering and Construction Technology, Mashine design, and Engineering Mechancs.

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

Other information:

This course will replace course 466105S Design of Steel Structures in Academic year 2020-21.

485104A: Structural renovation of buildings, 5 op

Voimassaolo: 01.08.2019 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Civil Engineering field

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

466117S	Structural renovation of buildings	5.0 op

ECTS Credits:

5 ECTS credits / 132 hours of work

Language of instruction:

Finnish

Timing:

Autumn, Periods 1 and 2

Learning outcomes:

After completing the course students can describe different structural materials and structural systems used in residential buildings in 1900-2000. They are able to identify and explain the typical risk structures and defects in those buildings. They can also explain the old design codes and recommendation used in Finland.

Contents:

Finnish house construction and typical details during 1900-2000. Standards, design recommendations and design methods used in Finland.

Mode of delivery:

Lecture room teaching

Learning activities and teaching methods:

Lectures and exercises

Target group:

Students studying structural engineering

Prerequisites and co-requisites:

Fundamentals of building construction and building physics

Recommended or required reading:

Lecture material.

Assessment methods and criteria:

Passed practical works and exam

Grading:

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

Person responsible:

Senior research fellow Antti H. Niemi

Other information:

This course will replace course 466117S in Academic year 2020-21.

A485123: Civil Engineering, Module preparing for the Option / Mining Engineering, 40 op

Voimassaolo: 01.08.2018 -
Opiskelumuoto: Intermediate Studies
Laji: Study module
Vastuuyksikkö: Civil Engineering field
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

Mining Engineering

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:

Stdents 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 th or 7 th 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

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, 6th or 7th 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

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

461011A: Strength of Materials II, 7 op

Voimassaolo: - 31.07.2021

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Mechanical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Laukkanen, Jari Jussi

Opintokohteen kielet: Finnish

Leikkaavuudet:

461104A Strength of materials II 5.0 op

ECTS Credits:

5 ects /135 hous of work

Language of instruction:

Finnish

Timing:

Lectures and exercises take place during the periods 1 - 2.

Learning outcomes:

The aim of this course is to provide students with a general view of the different areas concerning the strength of materials. Learning outcomes: Upon completion of the course, the student should be able to use the basic methods of fatigue strength estimation and fracture mechanics to estimate the life of simple structures. He/she is also able to solve the problem concerning the buckling of columns and beam columns. Moreover, the student is able to solve the problem of the bending of curved beams and free and warping torsion of beams.

Contents:

Basic methods of fatigue strength estimation; Basics of fracture mechanics; Buckling of columns and beam columns; Bending of curved beams; Free and warping torsion;

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

This course will be based on lectures 45 h and exercises 45 h and 45 h self-study during periods 1 - 2 and will have a final exam or mid-term exams.

Prerequisites and co-requisites:

Statics and Strength of Materials I

Recommended or required reading:

Pennala, E.: Lujuusopin perusteet, Moniste 407, Otatieto, 1998; Outinen, H., Koski, J., Salmi, T.: Lujuusopin perusteet, Pressus Oy, Tampere, 2000 ;Salmi, T., Virtanen, S.: Materiaalien mekaniikka, Pressus Oy, Tampere, 2008; Ylinen, A.:Kimmo- ja lujuusoppi I ja II. WSOY, 1976;. Bära brista, grundkurs i hållfasthetslära, AWE/Gebers, Stockholm 1979.

Assessment methods and criteria:

Midterm exams or one final exam is required. After the passed exercises a student is allowed to take part in an exam.

Grading:

Numerical grading scale 1-5.

Person responsible:

University Teacher Jari Laukkanen

461106A: Dynamics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Mechanical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Koivurova Hannu

Opintokohteen kielet: Finnish

Leikkaavuudet:

461018A-01 Dynamics, examination 0.0 op

461018A-02 Dynamics, exercises 0.0 op

461018A Dynamics 4.0 op

ECTS Credits:

5 ECTS credits / 120 hours of work

Language of instruction:

Finnish

Timing:

The course is held in the spring semester, during periods 3 and 4. It is recommended to complete the course at the 2st spring semester.

Learning outcomes:

The aim of this course is to provide students with the ability to examine the relationship between the forces on a solid body and the resulting motion, position, speed and acceleration of the body. Learning outcomes: Upon completing the required coursework, the student knows and is able to explain the fundamental quantities and the base laws of the classical mechanics. He/she is able to choose an appropriate coordinate system and analyze the motion - position, velocity, and acceleration - of the parts of a device. The student is able to draw a free body diagram of a moving system, and compose and derive the equations of motion for a system using the direct momentum method, the work-energy method, and the impulse-momentum method.

Contents:

Introduction; Kinematics of a particle; Plane kinematics of a rigid body; Kinetics of a particl;. Basics of mechanical vibrations; Kinetics of a system of particles; Plane kinetics of a rigid body.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 45 h / Exercise 30 h / Self-study 45 h.

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. (2003) Dynamiikka 1, kinematiikka, Pressus; Salmi, T. (2002) Dynamiikka 2, kinetiikka, 2. p., Pressus. Oheiskirjallisuus: Salonen, E.M. (2000) Dynamiikka I, 8. korj. p., Otatieto; Salonen, E.M. (1999) Dynamiikka II, 8. korj. p., Otatieto; Beer, F., Johnston, E.(2007) Vector Mechanics for Dynamics, 9.ed., McGraw-Hill

Assessment methods and criteria:

This course utilizes continuous assessment. During the course, there are three intermediate exams. In addition to this, the students will be asked to calculate homeworks, and theses homeworks will be assessed. The assessment of the course is based on the learning outcomes of the course. The more detailed assessment criteria are available on the Optima Study Portal.

Grading:

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

Person responsible:

University Lecturer Hannu Koivurova

461108A: Mechanics of materials, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Mechanical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Koivurova Hannu

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 90 hours of work

Language of instruction:

Finnish

Timing:

The course is held in the autumn semester, during periods 1 and 2. It is recommended to complete the course at the 3rd autumn semester.

Learning outcomes:

Upon completing the required coursework, the student knows the theoretical background of the strength of materials and he/she is able to apply the theory of the strength of materials to different kind of design problems needed in engineering mechanics. He/she understand the fundamental concepts of mechanics of deformable solids; including static equilibrium, geometry of deformation, and material constitutive behavior. He/she can discuss the basic mechanical principles underlying modern approaches for modelling of various types of materials under a different type of loadings. This provide students with exposure to the systematic methods for solving engineering problems in solid mechanics. He/she can also build the necessary theoretical background for further structural analysis and design courses.

Contents:

The general equations of mechanics. The stress and strain state. Different material models; Linear elastic material, isotropic, transverse-isotropic and orthotropic material models. The concept of strain energy. Theory of plasticity. Yield criterion, plastic flow rule and hardening. Limit state design. Introduction to visco elastic material and creep teory.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 30 h / Exercise 30 h / Self-study 30 h.

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., Virtanen, S. (2008) Materiaalien Mekaniikka. Pressus Oy.

Assessment methods and criteria:

This course utilizes continuous assessment. During the course, there are three intermediate exams. In addition to this, the students will be asked to calculate homeworks, and theses homeworks will be assessed. The assessment of the course is based on the learning outcomes of the course. The more detailed assessment criteria are available on the Optima Study Portal.

Grading:

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

Person responsible:

University Lecturer Hannu Koivurova

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 internalgeophysical properties and the interactions between different spheres, can describe large scale transfer (movement) of rock material inside the Earth and on its surface (convention, plate tections) 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., 20014. Geofysiikka, Tunne maapallosi. 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

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 /133 hours of work

Language of instruction:

English

Timing:

3rd year 3rd period

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

Working life cooperation:

No

Other information:

-

485980A: Bachelor's Thesis, 8 op

Voimassaolo: 01.08.2019 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Civil Engineering field
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

ECTS Credits:
8 ects
Language of instruction:
Finnish, can be written in English if needed.
Timing:
The end of Bachelor's studies
Learning outcomes:
Upon completion of the thesis the student can create a research plan, and define a research problem and research questions. She/He is able to manage her/his own work according to the project plan. The student can also utilize different information sources and critically evaluate the information obtained. The student is able to produce clear and finalized text, in line with technical and scientific writing practices.
Contents:
The student chooses the theme for the thesis in cooperation with his/her supervisor.
Mode of delivery:
The thesis is written towards the end of the BSc studies, typically during the third year.
Learning activities and teaching methods:
Independent work.
Target group:
Bachelor Students of Civil Engineering.
Prerequisites and co-requisites:
Basic and intermediate studies.
Recommended optional programme components:
Information Skills and Technical communication
Assessment methods and criteria:
BSc thesis and related maturity test.
Grading:
pass/fail
Person responsible:
The supervisor of Thesis
Working life cooperation:
Thesis' theme is often selected from the real research project or it is possible to do with industrial company.

900060A: Technical Communication, 2 op

Voimassaolo: 01.08.2005 - 31.07.2021

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay900060A	Technical Communication (OPEN UNI)	2.0 op
470218P	Written and Oral Communication	3.0 op

Proficiency level:
-
Status:
This course unit is compulsory for students of Electrical Engineering, Computer Science, Communications Technologies and Engineering Mechanical Engineering, Process and Environmental Engineering.
Required proficiency level:
-
ECTS Credits:
2 credits
Language of instruction:
Finnish
Timing:
1st year: Process and Environmental Engineering
2nd year: Communications Technologies
3rd year: Geoscience; Mechanical Engineering; Electrical Engineering, Computer Science and Engineering Technologies

Mode of delivery:
Multimodal teaching
Learning activities and teaching methods:
Contact hours ca. 20 h and independent group work or self-study ca. 34 h.
Target group:
Bachelors students of Electrical Engineering, Computer Science, Communications Technologies and Engineering Mechanical Engineering, Process and Environmental Engineering.
Prerequisites and co-requisites:
-
Recommended optional programme components:
-
Recommended or required reading:
Kauppinen, Anneli & Nummi, Jyrki & Savola, Tea: Tekniikan viestintä: kirjoittamisen ja puhumisen käsikirja (EDITA); Nykänen, Olli: Toimivaa tekstiä: Opas tekniikasta kirjoittaville (TEK) and material in Optima study environment.
Assessment methods and criteria:
Active participation in contact teaching, independent study and completion of given assignments.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Pass / fail
Person responsible:
Kaija Oikarainen

Working life cooperation:
-
Other information:
All students are required to attend the first meeting of the course unit so the work groups can be formed and work started in a timely and efficient manner. When signing up for the course unit, you should keep in mind that completing it requires a responsible attitude and a strong commitment to the work because the teamwork-based exercises rely heavily on the participation and activity of the students.
If the student is involved in the University's student associations or functions in a position of trust in university government, student union administration or Oulun Teekkariyhdistys ry (or in its subordinate guilds), he/she may be relieved of some of the group communication exercises. These compensatory actions must always be agreed upon separately with the course unit's teacher. The student must present an official statement from a person in charge of the governing body or association, which details the student's tasks and involvement with that body or association. Participation that took place over five years ago does not entitle the student to any compensation.

485981A: The Maturity Test for Bachelor's Degree, 0 op

Voimassaolo: 01.08.2019 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Civil Engineering field

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
0 ects
Language of instruction:
Finnish or Swedish.
Timing:
After completion of the bachelor's thesis.
Learning outcomes:
The student can produce mature text in popular form of the research field and thus show ones familiarity to the field.
Contents:
Depends on the topic of the thesis.
Mode of delivery:
Literary work
Learning activities and teaching methods:
Exam

Target group:
Bachelor Students of Civil Engineering
Recommended optional programme components:
Will be written after the Bachelor's Thesis has been submitted for review.
Assessment methods and criteria:
Student writes an essay in his/her native language about the topic of the Bachelor's thesis to show a good command of the language and the content of the thesis
Grading:
Pass or fail. Both the contents and language are assessed.
Person responsible:
Supervisor of Thesis

Tutkintorakenteisiin kuulumattomien opintokokonaisuuksien ja -jaksojen kuvaukset

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 ECTS credits / 132 hours of work
Language of instruction:
Finnish
Timing:
Spring semester, periods 3-4
Learning outcomes:
Ability to develop relevant structural designs and calculations using modern computational tools. Ability to present the results of the design both orally and in writing. Knowledge of the properties of different structural models from the viewpoint of structural dimensioning. Understanding of the fundamentals of yield line theory. Ability to determine the plastic limit load of a slab using the yield line theory. Knowledge of the special features of curved shell structures and their implications for structural design.
Contents:
Structural models. Loading. Plates and slabs. Membrane theory of shells. Theory of shell edge effects. Stability.
Mode of delivery:
Face-to-face
Learning activities and teaching methods:
Lectures, excercises and self study
Target group:
Students studying structural engineering
Prerequisites and co-requisites:
466101A Introduction to building construction, 466102A Introduction to structural design, 461107A Finite Element Methods I, 461108A Mechanics of materials
Recommended or required reading:
The course material will be distributed during the lectures.
Assessment methods and criteria:
Homework and exercises
Grading:
Numerical grading scale 1-5. Grade 0 stands for a fail.
Person responsible:

Senior research fellow Antti Niemi
Other information:
This course replaces course 466103A Project work in structural engineering in Academic year 2019-20.

460004S: Practical Training II, 5 op

Voimassaolo: 01.08.2015 -
Opiskelumuoto: Advanced Studies
Laji: Practical training
Vastuuyksikkö: Field of Mechanical Engineering
Arvostelu: 1 - 5, pass, fail
Opettajat: Reijo Saari
Opintokohteen kielet: Finnish
Leikkaavuudet:

485002S	Advanced Practical Training	5.0 op
460002S	Practical Training II	3.0 op

Ei opintojaksokuvauksia.