Opasraportti

OMS - Degree programme in Mining Engineering and Mineral Processing (2017 - 2018)

Mining engineering and Mineral processing degree programme serves mining industry by educating professionals who are familiar with the principles of the safe and sustainable mining and mineral processing, and who are able to design and manage the activities accordingly.

Bachelor of Science (Tech.) degree covers the first 3 years of the studies giving an excellent basis not only for the further specialization studies but also readiness for the basic-level design and operations in the field. The curriculum includes e.g. basic courses in mining technology, mineral processing and geophysics as well as in process technology, geoscience, maths, chemistry and physics.

Structure of Bachelor studies

http://webcgi.oulu.fi/studiag/index.php?kieli=6&kaavio=457

Advanced level studies on the 4th and 5th year (Master´s programme) strengthen and widen the knowledge of the students by giving them more profound understanding of design, research and planning operations in mining and mineral processing.

Structure of Master studies

http://webcgi.oulu.fi/studiag/index.php?kieli=1&kaavio=492

Mining Engineering line of specialization gives a student a good basic knowledge of the mine value chain and the phases therein. A graduating student understands economical, regulatory, geological and technical principles related to the sustainable mining. He/she is specialized in the processes of for example rock engineering and excavation techniques, and recognizes the environmental and social aspects of the mining.

Mineral processing students master the unit processes used in processing of the minerals and is aware of the geological, technical, economical and legal aspects of the sustainable operations. The students know well the mineral processing techniques, phenomena and automation, and simulation techniques used in concentrating plants.

The aim of the studies in Applied geophysics is to train the student to master the main geophysical methods and measurement techniques and analyze the data obtained, and apply the knowledge in the whole mine life cycle, taking the requirements of the sustainable mining into account.

Tutkintorakenteet

Master of Science (Tech), Mining Engineering and Mineral Processing

Tutkintorakenteen tila: published

Lukuvuosi: 2017-18

Lukuvuoden alkamispäivämäärä: 01.08.2017

Supplementary Studies, Mining Engineering and Mineral Processing (enintään 60 op)

Choose these supplementary studies if you have not taken Bachelor's degree at the degree programme in Mining Engineering and Mineral Processing, and if so called 'Bridge studies' (max 60 ECTS) have been planned for you. If you are unsure on which courses to choose, contact Student Adviser.

A439126: Bridge studies, Mining Technology and Mineral Processing, 0 - 60 op
- *Bridge Studies*
  - 031010P: Calculus I, 5 op
  - 031075P: Calculus II, 5 op
  - 031076P: Differential Equations, 5 op
  - 031078P: Matrix Algebra, 5 op
  - 031022P: Numerical Analysis, 5 op
  - 461102A: Statics, 5 op
  - 771113P: Introduction to Geology I, 5 op
  - 774311A: A Basic Course in Geochemistry, 5 op
  - 771117P: Basic course in mineralogy, 5 op
    - *Compulsory*
      - 771117P-01: Basic mineralogy, lectures, 0 op
      - 771117P-02: Basic mineralogy, mineral identification, 0 op
  - 477122A: Bulk Solids Handling, 5 op
  - 461103A: Strength of materials I, 5 op
  - 461106A: Dynamics, 5 op
  - 492300A: Rock mechanics, 5 op
  - 493302A: Chemical phenomena in mineral processes, 5 op
  - 477201A: Material and Energy Balances, 5 op
  - 477052A: Fluid Mechanics, 5 op
  - 488102A: Hydrological Processes, 5 op
  - 493300A: Principles of mineral processing, 5 op
  - 031080A: Signal Analysis, 5 op
  - 802339A: Basic course in inverse problems, 5 op
  - 521141P: Elementary Programming, 5 op
  - 488051A: AutoCAD and Matlab in Process and Environmental Engineering, 5 op
  - 761111P: Basic mechanics, 5 op
  - 761114P: Wave motion and optics, 5 op
  - 494301A: Geophysical research methods of rock and soil, 5 op
  - 494302A: GIS and spatial data, 5 op
  - 494303A: Hydrology in geosciences, 5 op
  - 494304A: Seismology, 5 op
  - 771115P: Introduction to bedrock geology of Finland and ore geology, 5 op

Modules of the Study Options (60 op)

Choose one of the followind modules.

The Study Option of Mineral Processing

A439127: Mineral Processing, Module of the Option, 0 - 60 op
- *Mineral Processing*
  - 772694S: Geometallurgy and mineral processing, 5 op
  - 493606S: Mine Geology, 5 op
  - 772335A: Introduction to ore mineralogy, 5 op
  - 477713S: Automation in Mineral Processing, 5 op
  - 493605S: Ore benefication technologies, 5 op
  - 477415S: Thermodynamic and process modelling in metallurgy, 5 op
  - 493607S: Quality requirements for concentrate, 5 op
  - 493608S: Development of benefication processes, 10 op
  - 492603S: Mining Project feasibility study, 5 op
  - 493609S: Mining, environment and society, 5 op

491602S: Professional practical training, 5 op

The Study Option of Mining Engineering

A439128: Mining Engineering, Module of the Option, 0 - 60 op
Mining Engineering
493301A: Mining geophysics, 5 op
493606S: Mine Geology, 5 op
772694S: Geometallurgy and mineral processing, 5 op
492607S: Stress wave theory and applications, 5 op
492600S: Mining Engineering, 10 op
492608S: Rock blasting, 5 op
492602S: Financial and Project valuation of mining, 5 op
492603S: Mining Project feasibility study, 5 op
466107S: Design of concrete structures, 6 op
493609S: Mining, environment and society, 5 op
491602S: Professional practical training, 5 op

The Study Option of Applied Geophysics

A439131: Module of the Option, Applied Geophysics, 60 op
Applied Geophysics
493301A: Mining geophysics, 5 op
494601S: Electrical and EM-methods I, 5 op
494602S: Electrical and EM-methods II, 5 op
494603S: GIS applications, 5 op
494604S: Seismic soundings, 5 op
494605S: Potential fields and airborne geophysics I, 5 op
494606S: Potential fields and airborne geophysics II, 5 op
493606S: Mine Geology, 5 op
492603S: Mining Project feasibility study, 5 op
493609S: Mining, environment and society, 5 op
492602S: Financial and Project valuation of mining, 5 op
491602S: Professional practical training, 5 op

Supplementary module (30 op)

Master's Thesis (30 op)

491601S: Master's thesis, 30 op
491600S: Maturity test, 0 op

Mining Engineering and Mineral Processing, BSc (Tech)

Tutkintorakenteen tila: archived

Lukuvuosi: 2017-18

Lukuvuoden alkamispäivämäärä: 01.08.2017

Basic and Intermediate Studies (100 op)

A439105: Basic and Intermediate Studies, Mining Engineering and Mineral Processing, 100 op
Compulsory
491100P: Orientation to OMS studies, 1 op
491101P: Introduction to mining, 5 op
031010P: Calculus I, 5 op

031075P: Calculus II, 5 op
031076P: Differential Equations, 5 op
031078P: Matrix Algebra, 5 op
031021P: Probability and Mathematical Statistics, 5 op
031022P: Numerical Analysis, 5 op
761113P: Electricity and magnetism, 5 op
780120P: Basic Principles in Chemistry, 5 op
030005P: Information Skills, 1 op
902150Y: Professional English for Technology, 2 op
901044Y: Second Official Language (Swedish), Written Skills, 1 op
901045Y: Second Official Language (Swedish), Oral Skills, 1 op
488142A: Environmental legislation and EIA, 5 op
771113P: Introduction to Geology I, 5 op
771114P: Introduction to Geology II, 5 op
771117P: Basic course in mineralogy, 5 op
Compulsory
771117P-01: Basic mineralogy, lectures, 0 op
771117P-02: Basic mineralogy, mineral identification, 0 op
774311A: A Basic Course in Geochemistry, 5 op
491102P: Introduction to solid earth geophysics, 5 op
493300A: Principles of mineral processing, 5 op
492300A: Rock mechanics, 5 op
477502A: Experiment design and analysis, 5 op
Select 4 credits English courses
902142Y: Business Correspondence, 2 op
902145Y: Working Life Skills, 2 op
902147Y: Academic Vocabulary for Science and Technology, 2 op
902149Y: Mechanics of Writing, 2 op

Preparing Studies to Study Options (55 op)

Studies Preparing for the Option, Mining Engineering and Mineral Processing

A439129: Studies Preparing for the Option, Mining Engineering and Mineral Processing, 55 op
Compulsory
477013P: Introduction to Process and Environmental Engineering, 5 op
477052A: Fluid Mechanics, 5 op
488102A: Hydrological Processes, 5 op
461102A: Statics, 5 op
461106A: Dynamics, 5 op
461103A: Strength of materials I, 5 op
477122A: Bulk Solids Handling, 5 op
780123P: Introductory Laboratory Works in Chemistry, 5 op
477201A: Material and Energy Balances, 5 op
477401A: Thermodynamic Equilibria, 5 op
493302A: Chemical phenomena in mineral processes, 5 op

Studies Preparing for the Option, Applied Geophysics

A439130: Studies Preparing for the Option, Applied Geophysics, 55 op
Compulsory
031080A: Signal Analysis, 5 op
802339A: Basic course in inverse problems, 5 op
521141P: Elementary Programming, 5 op
488051A: AutoCAD and Matlab in Process and Environmental Engineering, 5 op
761111P: Basic mechanics, 5 op
761114P: Wave motion and optics, 5 op
494301A: Geophysical research methods of rock and soil, 5 op
494302A: GIS and spatial data, 5 op
494303A: Hydrology in geosciences, 5 op
494304A: Seismology, 5 op
771115P: Introduction to bedrock geology of Finland and ore geology, 5 op

Working Life Studies (25 op)

A439124: Working Life Studies, Mining Technology and Mineral Processing, 25 op
Working Life Studies
555225P: Basics of industrial engineering and management, 5 op
555265P: Occupational Safety and Health Management, 5 op
491300A: Practical Training, 5 op
900060A: Technical Communication, 2 op
491302A: Bachelor's thesis, 8 op
491303A: Maturity test, 0 op

Tutkintorakenteisiin kuulumattomat opintokokonaisuudet ja -jaksot

493610A: Oulu Mining Summit, 1 op
491687S: Process modeling in mineral processing, 5 op

Opintojaksojen kuvaukset

Tutkintorakenteisiin kuuluvien opintokohteiden kuvaukset

A439126: Bridge studies, Mining Technology and Mineral Processing, 0 - 60 op

Voimassaolo: 01.08.2016 -
Opiskelumuoto: Supplementary Module
Laji: Study module
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

Bridge Studies

031010P: Calculus I, 5 op

Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Applied Mathematics and Computational Mathematics
Arvostelu: 1 - 5, pass, fail
Opettajat: 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 1-5. In the numerical scale zero stands for a fail.

Person responsible:

Ilkka Lusikka

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: Ilkka Lusikka
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, 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 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 1-5. 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

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:

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

Recommended optional programme components:

-

Recommended or required reading:

Recommented 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.
Lue lisää opintosuoritusten arvostelusta yliopiston verkkosivulta.

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:

-

Other information:

-

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:

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Recommended optional programme components:

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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:

-

031022P: Numerical Analysis, 5 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Applied Mathematics and Computational Mathematics

Arvostelu: 1 - 5, pass, fail

Opettajat: Marko Huhtanen

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS credits / 135 hours of work

Language of instruction:

Finnish. English speaking students should contact the instructor.
The course can be completed in English by intermediate exams or by a final exam.

Timing:

Spring semester, period 3

Learning outcomes:

Knows numerical algorithms for solving basic problems in computing. Knows basics about numerical linear algebra and some of its applications. Knows how nonlinear systems are solved and how they appear in optimization. Knows how differential equations are solved numerically.

Contents:

Numerical linear algebra, numerical methods for systems of equations, unconstrained optimization, basics of the approximation theory, numerical quadratures, numerical methods for ordinary differential equations.

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:

Completion of courses Calculus I and II, a course on Differential Equations and a Course on Linear Algebra.

Recommended optional programme components:

-

Recommended or required reading:

Material posted on the web-page of the course.

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 1-5. In the numerical scale zero stands for a fail.

Person responsible:

Marko Huhtanen

Working life cooperation:

-

Other information:

-

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.

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

774311A: A Basic Course in Geochemistry, 5 op

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS

Language of instruction:

The language of instruction is Finnish. The course can also be completed in English as a book examination.

Timing:

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

Learning outcomes:

Upon completion of this course, the student will:

have a broad overview of the different fields of geochemistry, be able to relate the behaviour of elements to different physico-chemical processes in nature
be able to convert geochemical data from one form to another (wt.%, molar and cation proportions, milliequivalents)

can plot geochemical data on different diagramscan carry out simple mineral dissolution/precipitation and mass balance calculations.

Contents:

Geochemistry as a field of science; history of geochemistry; tasks and fields of geochemistry; origin and electron configuration of chemical elements; origins and structure of the Earth; meteorites; the geochemical classification of the elements; composition of earth's different spheres; geochemical differentiation; composition of magmas; dissolution and precipitation of minerals; pH-Eh-diagrams; introduction to isotope geochemistry.

Mode of delivery:

Face to face teaching.

Learning activities and teaching methods:

32 h lectures, 12 h exercises.

Target group:

All students in geosciences and mineral processing and mining technology.

Prerequisites and co-requisites:

A basic course in chemistry

Recommended optional programme components:

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

Recommended or required reading:

Gill, Robin (1996) Chemical Fundamentals of Geology, Chapman & Hall, London, 298 p. Additional material will be given during the lectures.

You can check the availability of the course book via this link.

Assessment methods and criteria:

Examination in both theory and calculations.

Grading:

The course utilizes a numerical grading scale 1-5. The grade is calculated as the average of the marks of two exams. Zero stands for a fail.

Person responsible:

Eero Hanski

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

Ei opintojaksokuvauksia.

Compulsory

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

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Basic Studies
Laji: Partial credit
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opettajat: Pekka Tuisku
Opintokohteen kielet: Finnish
Voidaan suorittaa useasti: Kyllä

Ei opintojaksokuvauksia.

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

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Basic Studies
Laji: Partial credit
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opettajat: Jukka-Pekka Ranta
Opintokohteen kielet: Finnish
Voidaan suorittaa useasti: Kyllä

Ei opintojaksokuvauksia.

477122A: Bulk Solids Handling, 5 op

Voimassaolo: 01.08.2015 - 31.07.2023

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Process and Environmental Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Maria Salmela-Karhu

Opintokohteen kielet: Finnish

Leikkaavuudet:

477120A	Fluid and Particle Engineering	5.0 op
477102A	Fluid and Particle Technology II	4.0 op

ECTS Credits:

5 ECTS / 133 h of work

Language of instruction:

Finnish

Timing:

Implementation in period 2 (autumn term)

Learning outcomes:

Upon completion of the course, a student should be able to identify auxiliary mechanical unit processes as well as equipments and phenomena related to them. In addition, the student can explain application of unit processes and can describe their operational principles.

Contents:

Liquid and susensions: fluid mechanics, pumping and hydraulic transport, mixing. Gases and aerodispersions: gas dynamics, compression, pneumatic transport. Granular bulk material: properties, storage, mechanical transportation, fluidization.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

The implementation methods of the course vary. Lectures and exercises max. 48 h. A part of teaching can be replaced by home or group works.

Target group:

Bachelor students in process or environmental engineering

Prerequisites and co-requisites:

477101A Particle Technology

Recommended optional programme components:

-

Recommended or required reading:

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

Assessment methods and criteria:

This course utilizes continuous assessment including lecture diaries and three intermediate exams. Alternatively, the course can also be completed by taking the end exam.

Grading:

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

Person responsible:

Maria Salmela-Karhu

Working life cooperation:

No

Other information:

-

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.

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 1 and 2. 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

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:

-

493302A: Chemical phenomena in mineral processes, 5 op

Voimassaolo: 01.08.2016 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opettajat: Saija Luukkanen
Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS / 133 hours of work

Language of instruction:

Finnish, course material in English

Timing:

The course is held in the spring semester, during period 3. It is recommended to complete the course at the 3rd spring semester

Learning outcomes:

Upon succesfull completion student can explain physical-chemical phenomenons (especially surface and electro chemical) affecting various unit operations in mineral processing. Student can also describe general phases in mineral processing and unit operation from standpoint of physical chemistry.

Contents:

Basic equations in thermodynamics; chemical interactions especially in interfaces; electrochemical interactions.

Mode of delivery:

Face to face teaching

Learning activities and teaching methods:

32 h lectures and practicals

Target group:

Major students in Mining engineering and mineral processing, minor subject students in Geosciences and Process engineering.

Prerequisites and co-requisites:

493300A Principles of Mineral Processing

Recommended optional programme components:

-

Recommended or required reading:

Lecture and electronic material

Assessment methods and criteria:

Final exam, practicals, activity

Grading:

1-5/fail

Person responsible:

Saija Luukkanen

Working life cooperation:

No

Other information:

-

477201A: Material and Energy Balances, 5 op

Voimassaolo: 01.08.2005 - 31.12.2019

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Process and Environmental Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Tiina Leiviskä

Opintokohteen kielet: Finnish

Leikkaavuudet:

477221A	Material and Energy Balances	5.0 op
470220A	Fundamentals of Chemical Process Engineering	5.0 op

ECTS Credits:

5 ECTS /133 hours of work

Language of instruction:

Finnish. The course can be completed in English as a book examination.

Timing:

Spring periods 3 and 4.

Learning outcomes:

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

Contents:

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

Mode of delivery:

Lectures and group exercise

Learning activities and teaching methods:

Lectures 40h, group work 10h and self-study 80h

Target group:

Bachelor students in of Process or Environmental Engineering

Prerequisites and co-requisites:

Basics from the course Introduction to Process Engineering

Recommended optional programme components:

-

Recommended or required reading:

Reklaitis, G.V.: Introduction to Material and Energy Balances. John Wiley & Sons, 1983. ISBN 0-471-04131-9.

Assessment methods and criteria:

During the course, there are two intermediate exams and both of them must be passed. Alternatively student can participate in final exam after the course. In addition to this, the students will be making a group exercise, which will be evaluated.
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:

Dr Tiina Leiviskä

Working life cooperation:

No

Other information:

-

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: Anna-Kaisa Ronkanen, 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 /135 hours of work

Language of instruction:

Finnish but also option to complete the course in English

Timing:

In the period 1

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 exercises.

Learning activities and teaching methods:

Lectures 10 h, exercises 16 h and independent work 109 h. Totally 135 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 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 assign-ments (80%) and examination (20%).

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

Working life cooperation:

-

Other information:

-

493300A: Principles of mineral processing, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opettajat: Saija Luukkanen

Opintokohteen kielet: English, Finnish

Leikkaavuudet:

ay493300A Principles of mineral processing (OPEN UNI) 5.0 op

ECTS Credits:

5 ECTS / 133 hours of work

Language of instruction:

Finnish; material mainly in English

Timing:

2nd period in the autumn. Recommended for the 3rd year students.

Learning outcomes:

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

Contents:

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

Mode of delivery:

Mainly face-to-face teaching

Learning activities and teaching methods:

Lectures, demonstrations, assignments

Target group:

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

Prerequisites and co-requisites:

-

Recommended optional programme components:

-

Recommended or required reading:

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

Assessment methods and criteria:

Final exam, home works and practicals, energy

Grading:

1-5/fail

Person responsible:

Saija Luukkanen

Working life cooperation:

No

Other information:

-

031080A: Signal Analysis, 5 op

Voimassaolo: 01.08.2015 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Applied Mathematics and Computational Mathematics
Arvostelu: 1 - 5, pass, fail
Opettajat: Kotila, Vesa Iisakki
Opintokohteen kielet: Finnish
Leikkaavuudet:

031050A	Signal Analysis	4.0 op

ECTS Credits:

5 ECTS credits / 135 hours of work

Language of instruction:

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

Timing:

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

Learning outcomes:

Upon completion of the course, the student:
-is able to calculate the energy, the power, the convolution and the frequency spectrum of discrete and analog, periodic and non-periodic deterministic signals
-is able to study the stationarity, the mutual dependence and the frequency content of random signals by means of the auto- and cross-correlation functions, and the power- and cross-power spectral densities
-is able to explain the mathematical grounds of the most central optimal systems used in signal estimation
-can solve related problems

Contents:

Signals, classification, frequency. Fourier analysis, analog and digital signal, fast Fourier transform. Random variable. Random signal. Stationarity, autocorrelation. Power spectral density. Poisson process, RTS-signal. Signal estimation, orthogonality principle, Yule-Walker equations, Wiener filter.

Mode of delivery:

Blended teaching.

Learning activities and teaching methods:

Lectures 28 h / Exercises 14 h / Self-study privately or in a group 93 h. The independent work includes individual STACK-assignments as online work.

Target group:

-

Prerequisites and co-requisites:

The recommended prerequisite is the completion of the courses 031078P Matrix Algebra, 031021P Probability and Mathematical Statistics and 031077P Complex Analysis.

Recommended optional programme components:

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

Recommended or required reading:

Lecture notes. Additional reading: Proakis, J.G., Manolakis, D.K.: Introduction to Digital Signal Pro-cessing. Shanmugan, K.S., Breipohl, A.M.: Random Signals, Detection, Estimation and Data Analysis.

Assessment methods and criteria:

The course is completed with a final exam or a retake exam. In addition to the final exam, STACK-assignments given during the course are part of the assessment. The assessment of the course is based on the learning outcomes of the course.
Read more about assessment criteria at the University of Oulu webpage.

Grading:

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

Person responsible:

Vesa Kotila

Working life cooperation:

-

Other information:

-

802339A: Basic course in inverse problems, 5 op

Voimassaolo: 01.06.2016 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Field of Mathematics
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

521141P: Elementary Programming, 5 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Computer Science and Engineering DP

Arvostelu: 1 - 5, pass, fail

Opettajat: Mika Oja, Mika Rautiainen

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay521141P Elementary Programming (OPEN UNI) 5.0 op

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

5 ECTS Cr

Language of instruction:

Lectures and learning material are in Finnish. The course can be completed in English by self-studying from a book, completing assignments and exercises on the course learning environment, and delivering a final project.

Timing:

Fall, period 1. There is an option to extend the course to the 2nd period in cases where completing in one period doesn't fit the student's schedule.

Learning outcomes:

1. Is capable of solving problems in the computer's terms

2. Understands the basic concepts of programming

3. Knows the basics of the Python programming language

4. Is able to implement programs independently

5. Is able to use the internet to find information about programming

Contents:

Problem solving with programming, basic concepts of programming, writing Python code.

Mode of delivery:

Web-based teaching + face-to-face teaching

Learning activities and teaching methods:

30h of exercise groups, 105h self-studying in the web.

Target group:

1 st year students of computer science and engineering, electrical engineering, medical and wellness technology and industrial and engineering management, 2nd year students of physics, and other students of the University of Oulu

Prerequisites and co-requisites:

None.

Recommended optional programme components:

The course provides a basis for subsequent programming courses.

Recommended or required reading:

Web material in an online learning environment. Address will be announced at the beginning of the course.

Assessment methods and criteria:

The course is completed by passing all learning assignments, programming exercises and a final exercise project. Read more about assessment criteria at the University of Oulu webpage
Read more about assessment criteria at the University of Oulu webpage.

Grading:

pass/fail.

Person responsible:

Mika Oja

Working life cooperation:

-

Other information:

-

488051A: AutoCAD and Matlab in Process and Environmental Engineering, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Process and Environmental Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Pekka Rossi, Aki Sorsa

Opintokohteen kielet: Finnish

Leikkaavuudet:

477033A	Programming in Matlab	2.5 op
477032A	AutoCAD in Process and Environmental Engineering	2.0 op

ECTS Credits:

5 ECTS /133 hours of work

Language of instruction:

Finnish

Timing:

Periods 3-4 (spring term)

Learning outcomes:

Upon completion of the course, the student will have readiness to use AutoCAD and Matlab programs in different planning and problem solving assignments of process and environmental engineering.

Contents:

Properties of the AutoCAD program, planning exercises (e.g. process flow chart, map planning, instrumentation layout). Basic use, plotting, programming structures, problem solving and finding programming errors with Matlab.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Computer class lectures (24 h), exercises (36 h). Face-to-face teaching 20 h (lectures and group work).

Target group:

Bachelor level students in the Process and Environmental Engineering program

Prerequisites and co-requisites:

-

Recommended optional programme components:

-

Recommended or required reading:

Lecture notes

Assessment methods and criteria:

Continuous evaluation of exercises. Home assignments.

Grading:
Pass/fail
Person responsible:
Post-doctoral researchers Pekka Rossi and Aki Sorsa
Working life cooperation:
No
Other information:
-

761111P: Basic mechanics, 5 op

Voimassaolo: 01.01.2015 -
Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Field of Physics
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish
Leikkaavuudet:

761118P Mechanics 1 5.0 op
761118P-02 Mechanics 1, lab. exercises 0.0 op
761118P-01 Mechanics 1, lectures and exam 0.0 op
ay761111P Basic mechanics (OPEN UNI) 5.0 op
761101P Basic Mechanics 4.0 op

Ei opintojaksokuvauksia.

761114P: Wave motion and optics, 5 op

Voimassaolo: 01.01.2015 -
Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Field of Physics
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish
Leikkaavuudet:

761310A Wave motion and optics 5.0 op
761310A-01 Wave motion and optics, lectures and exam 0.0 op
761310A-02 Wave motion and optics, lab. exercises 0.0 op
761104P Wave Motion 3.0 op

Ei opintojaksokuvauksia.

494301A: Geophysical research methods of rock and soil, 5 op

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opettajat: Moisio, Kari Juhani
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

494302A: GIS and spatial data, 5 op

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opettajat: Moisio, Kari Juhani
Opintokohteen kielet: Finnish

ECTS Credits:

5 credits

Language of instruction:

Finnish

Timing:

Autumn term

Learning outcomes:

After completion the student collects 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 visualise spatial data in various different ways.

Contents:

Geoscientific observations and measurements are always tied to spatial location of the data. 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 visualisation of spatial data. Computer exercises demonstrate preparation and visualisation of geoscientific data in practice.

Mode of delivery:

Face to face

Learning activities and teaching methods:

Lectures and exercises totalling 40 h plus independent study 93 h.

Target group:

Students of Oulu Mining School, and the Faculties of Science and Technology. Obligatory to geosciences students in B.Sc. degree and Mining engineering and mineral processing/ Applied geophysics students in BSc (Tech) degree.

Prerequisites and co-requisites:

No specific prerequisites.

Recommended optional programme components:

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

Recommended or required reading:

Lecture notes and Löytönen, M., Toivonen, T. & Kankaanrinta, I., (Eds.) 2003: Globus GIS.

Assessment methods and criteria:

Examination and computer test.

Grading:

5-1/fail

Person responsible:

Kari Moisio

Working life cooperation:

No work practise.

Other information:

Course website

494303A: Hydrology in geosciences, 5 op

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opettajat: Moisio, Kari Juhani
Opintokohteen kielet: Finnish

ECTS Credits:

5 credits

Language of instruction:

Finnish (It is possible to do the course in English, although all the lectures and exercises will be given in Finnish).

Timing:

Spring term

Learning outcomes:

Upon the completion of the course, a student
- can define the concept of a water cycle, can name the elements of the cycle, can identify their physical basis and can estimate the magnitude of different components using the water balance equation
- can name and distinguish the principles of the methods used to observe evaporation, precipitation and runoff, and summarize their spatial and temporal variation in Finland
- can describe the behaviour of underground water in vadoze zone and aquifers and can define how the groundwater is formed and how it flows
- can identify different types of aquifers and can describe their relationship with structures of soil and bedrock
- owns basics of hydrogeology (groundwater geology)
- can name major geological and geophysical methods used in groundwater research and exploration

Contents:

Introduction to hydrology and hydrological processes in geosciences. Properties and behaviour of water in hydrosphere including hydrological cycle, its different components (evaporation, precipitation and runoff) and their relationship, observations and spatial and temporal variation of each hydrological component in Finland. The second part of the course introduces properties and behaviour of water underground including geohydrological and hydrogeophysical aspects of water and hydrogeology. This part of the course concentrates on the behaviour and properties of water in soil, superficial deposits and bedrock, particularly in Finland. Themes such as groundwater flow, aquifers, groundwater quality, geological and geophysical research methods in hydrogeology will also be introduced.

Mode of delivery:

Face to face

Learning activities and teaching methods:

40 h lectures, 20 h exercises, 100 h independent study.

Target group:

Mining engineering and Mineral processing/ option Applied geophysics, geoscience students, other students of the University of Oulu.

Prerequisites and co-requisites:

Recommended: Introduction to Solid Earth Geophysics (494301A)

Recommended optional programme components:

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

Recommended or required reading:

Handouts and lecture notes. Selected parts from: Hooli, J. & Sallanko, J., (1996) Hydrologian luentomoniste; Grundvatten, Teori & Tillämpning. Knutsson, G. & Morfeldt, C-O. (1993) Svensk Byggtjänst,

304 p. Maanalaiset vedet - pohjavesigeologian perusteet; Korkka-Niemi, K. & Salonen, V-P. (1996) Täydennyskoulutuskeskus. Turun yliopisto, 181 p. Mälkki, E. (1999) Pohjavesi ja pohjaveden ympäristö. Tammi, 304 p.

Assessment methods and criteria:

Examination

Grading:

5-1/fail

Person responsible:

Kari Moisio

Working life cooperation:

No

Other information:

Course website

494304A: Seismology, 5 op

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opettajat: Elena Kozlovskaya
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

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

Voimassaolo: 01.08.2015 -
Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opettajat: Kari Strand
Opintokohteen kielet: Finnish

ECTS Credits:

5 credits

Language of instruction:

Finnish

Timing:

1st year spring

Learning outcomes:

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

Contents:

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

Mode of delivery:

Face to face

Learning activities and teaching methods:

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

Target group:

Major and minor subject students starting studies in geology.

Prerequisites and co-requisites:

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

Recommended or required reading:

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

Assessment methods and criteria:

Written examination.

Grading:

5-1/fail

Person responsible:

Eero Hanski

Working life cooperation:

No

A439127: Mineral Processing, Module of the Option, 0 - 60 op

Voimassaolo: 01.08.2016 -
Opiskelumuoto: Advanced Studies
Laji: Study module
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

Mineral Processing

772694S: Geometallurgy and mineral processing, 5 op

Voimassaolo: 01.08.2012 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opettajat: Pertti Lamberg
Opintokohteen kielet: English

ECTS Credits:

5 credits

Language of instruction:

English

Timing:

4th or 5th year

Learning outcomes:

Upon completion of the course students should be able to: 1) Describe the principles of different areas of Geometallurgy (ore geology, process mineralogy, minerals processing, modeling and simulation) and how they are linked in a geometallurgical concept. 2) Use different research and analytical methods of importance for Geometallurgy and interpret the results. 3) Evaluate, analyze and interpret the geometallurgical data in a quantitative way. 4) Design a geometallurgical sampling, analysis and research campaign. 5) Design a geometallurgical program.

Contents:

The course will introduce main parts of the Geometallurgy: 1) ore geology, 2) process mineralogy and 3) minerals processing. The focus is in process mineralogy, mineral processing and in assimilating the geo-metallurgical concept. Exercises, assignments and seminars concentrate on practical aspects of Geometallurgy needed in mining industry.

Mode of delivery:

Face to face

Learning activities and teaching methods:

Lectures and PC classes with assignments 33 h.

Target group:

geology majors, minor subject students. Prerequisites and co-requisites: Ore geology (772385A), Introduction to Ore mineralogy (772335A).

Prerequisites and co-requisites:

Ore geology (772385A), Ore microscopy (772335A).

Recommended optional programme components:

ü Petruk, W. (2000) Applied Mineralogy in the Mining Industry, Elsevier Science B.V., Amsterdam.
ü Wills, B. & Napier-Munn, T. (2006) Wills' Mineral Processing Technology, Elsevier Science & Technology Books, ISBN: 0750644508.
ü Becker et al. (2016) Process Mineralogy, JKMRC Monograph Series in Mining and Mineral Processing: No. 6, ISBN: 978-1-74272-171-2

Recommended or required reading:

Petruk, W. (2000). Applied Mineralogy in the Mining Industry, Elsevier Science B.V., Amsterdam.
Will, B. & Napier-Munn, T. (2006) Wills' Mineral Processing Technology, Elsevier Science & Technology Books, ISBN: 0750644508.
The availability of the literature can be checked from this link.

Assessment methods and criteria:

Laboratory classes, Geometallurgical investigations (for the seminar) and the seminars are compulsory. Seminars, the investigation and the opposition are each awarded points based on the attained level. Assignments and reports must be delivered in time or there will be an automatic deduction of points. The total points production determines the grand grade of the course, and it is given on the scale Fail-1-5.
. For grade 1, the student must be able to describe different parts and procedures of Geometallurgy and to conduct a routine geometallurgical analysis.
. For grade 2, the student must be able to collect geometallurgical data and perform an analysis with interpretation.
. For grade 3 the student must be able to evaluate and interpret geometallurgical data provided by different analytical and research techniques and to report the results.
. For grade 4, the student must be able to design geometallurgical campaign, interpret the result and establish a geometallurgical program.
. For grade 5, the student must be able to apply the acquired skills to a new geometallurgical case, interpret, report and present the results and to defend the conclusions.

Grading:

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

Person responsible:

Jussi Liipo

Working life cooperation:

No

493606S: Mine Geology, 5 op

Voimassaolo: 01.08.2016 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

ECTS Credits:

5 ECTS /133 hours of work

Language of instruction:

English

Timing:

4th year 1stperiod

Learning outcomes:

Upon completion of the course the students should know about the principle activities along the mineral value chain in the mining environment (exploration, mining, mineral processing, environmental management). The course is given at the active Pyhäsalmi mine to optimize interaction with professionals and working live experience.

Contents:

Based on the processes in an active mine environment (Pyhäsalmi mine) various aspects of the development and operation of mines will be investigated. This includes the ore exploration and mine development, rock mechanics and mining technologies, mineral processing principles, and environmental management. Face to face teaching and mine visit

Mode of delivery:

Face to face teaching and mine visit

Learning activities and teaching methods:

Lectures, interaction with professionals at the Pyhäsalmi mine, and exercises (e.g. drill core logging).

Target group:

Masters students in the mining engineering and mineral processing study programme (compulsory course) and Masters students in Geosciences (optional course to fulfill the obligation of 10 ECTS in mining engineering and mineral processing study programme courses)

Prerequisites and co-requisites:

Introduction to Geology I and II; Basic course in mineralogy; Principles of mineral processing, Rock mechanics (BSc level courses) or completed BSc degree

Recommended optional programme components:

493301A Mining geophysics
774636S Geochemistry of mining environment
772632S Regional Ore Geology of Fennoscandia
772694S Geometallurgy and mineral processing

Recommended or required reading:

Abzalov, M. (2016) Applied Mining Geology, Springer, Modern approaches in solid Earth sciences 12, 448 p

Assessment methods and criteria:

Learning diary and report

Grading:

pass/fail

Person responsible:

Holger Paulick, Zongxian Zhang

Working life cooperation:

Course will be conducted in co-operation with partners from the Pyhäsalmi mine.

Other information:

Location of instruction is Pyhäsalmi mine

772335A: Introduction to ore mineralogy, 5 op

Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opettajat: Eero Hanski
Opintokohteen kielet: English
Voidaan suorittaa useasti: Kyllä

ECTS Credits:

5 ECTS

Language of instruction:

The language of instruction is Finnish or English, depending on the participants.

Timing:

The course is held in the autumn semester, during period I. It is recommended to complete the course at the 2nd or 3rd autumn semester.

Learning outcomes:

Upon completion of this course, the student will:
obtain basic knowledge on ore minerals and their mode of occurrence
learn to recognise the most common ore minerals and textures under the ore microscope.

Contents:

Division and structure of ore minerals, composition and texture, phase diagrams and their applications. Ore microscope and how it is used, microscopic properties of ore minerals. Identification of ore minerals and ore mineral assemblages.

Mode of delivery:

Face to face teaching.

Learning activities and teaching methods:

14 h lectures, 21 h exercises.

Target group:

All students in geosciences and mineral processing and mining technology.

Prerequisites and co-requisites:

The recommended prerequisite is the completion of the following courses prior to enrolling for the course: 771102P Basic mineralogy, 772339A Optical mineralogy.

Recommended optional programme components:

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

Recommended or required reading:

Textbook: Craig, J.P. & Vaughan, D.J. (1994) Ore Microscopy and Ore Petrography. Wiley & Sons, 2nd ed. 434 p.
Other handbook-type literature supporting the microscope excercises: Wiley & Sons, 2nd ed. 434 p. Ramdohr, P. (1980) The Ore Minerals and their Intergrowths, vol. 1 and 2. Pergamon Press, 1205 p. Spry P.G. & Gedlinski B.L. (1987) Tables for Determination of Common Opaque Minerals. Economic Geology Publishing Co. 52 p. Barnes H.L. (1997) Geochemistry of Hydrothermal Ore Deposits. John Wiley & Sons, Inc., New York, 3rd ed. 992 p. Nesse W.D. (2012) Introduction to Mineralogy, Oxford University Press. 480 p. Pracejus B. (2008) The ore minerals under the microscope – An optical guide. Atlases in Geosciences 3, Elsevier, 875 p.
The availability of the textbooks can be checked via this link.

Assessment methods and criteria:

Examination in both theory and calculations.

Grading:

In the theory exam grade and final grade, the course utilizes a numerical grading scale of 1-5. Zero stands for a fail. In the microscope exam, the course utilizes verbal grading pass/fail.

Person responsible:

Eero Hanski, Marko Moilanen

Working life cooperation:

No.

477713S: Automation in Mineral Processing, 5 op

Voimassaolo: 01.08.2013 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Process and Environmental Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Jari Ruuska, Leiviskä, Kauko Johannes

Opintokohteen kielet: Finnish

Leikkaavuudet:

477510S	Automation in Mineral Processing	5.0 op
477724S	Numerical Mine Modelling	5.0 op

ECTS Credits:

5 ECTS /135 hours of work

Language of instruction:

English

Timing:

Implementation in the 4th period (spring term)

Learning outcomes:

The target is to give the students the skills to understand and develop models for minerals processing and apply these models in process monitoring and control.

Contents:

Models for processes like crushing, grinding, flotation, leaching, separation etc. Examples how to use these models in process control and what kind of benefits can be drawn from their use.

Mode of delivery:

Lectures and demonstrations

Learning activities and teaching methods:

Lectures during one period

Target group:

Master’s students in process and environmental engineering. Exchange students.

Prerequisites and co-requisites:

Basic knowledge in minerals processing and control engineering

Recommended optional programme components:

-

Recommended or required reading:

Lecture notes in English

Assessment methods and criteria:

Continuous evaluation: lectures and test

Grading:

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

Person responsible:

Professor Kauko Leiviskä

Working life cooperation:

No

Other information:

-

493605S: Ore benefication technologies, 5 op

Voimassaolo: 01.08.2016 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English, Finnish

ECTS Credits:

5 ECTS /133 hours of work

Language of instruction:

English

Timing:

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

Learning outcomes:

Upon completion of the course students should be able to:

- Describe the principles and applications of the main mineral processing technologies
- Describe the variables effecting on the selection of the process technique and evaluate the most suitable technique for processing different types of materials based on their composition
- Understand the nature of the feed material and its influence in process selection, mineral processing technologies used in selected cases and process optimization
- Use design and optimization methods for applying in beneficiation plants

Contents:

Contents:

- Module 1: Introduction to minerals and mineralogy
- Module 2: Introduction to Mineral Processing Technology
- Module 3: Comminution - Size reduction
- Module 4: Beneficiation Technologies - Physical separation techniques
- Module 5: Physic-chemical separation techniques
- Module 6: Solid Liquid Separation
- Module 7 Case study of optimization
- Module 8: Seminar (assignment, laboratory work and findings in paper review)

Additionally it is included
Practice Ore characterization in optical microscopy
Laboratory test in crushing and grinding, PSD
Laboratory test of flotation
Laboratory test of sedimentation

Mode of delivery:

Classroom education, face to face teaching

Learning activities and teaching methods:

Lectures during one period.
Lectures 36 h / Laboratory tests 8 h/Group work 16 h/Self-study includes exercises and assignments 75 h

Target group:

Mineral processing majors, minor subject students and other form Oulu Mining School and Technology

Prerequisites and co-requisites:

493300A Principles in Mineral Processing, 493302A Chemical Phenomena in Mineral processing

Recommended optional programme components:

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

Recommended or required reading:

Wills & Napier-Munn: Mineral processing technology; Elsevier Science & Technology Books, ISBN: 0750644508
Gupta, A., Yan, D.S. (2006). Mineral Processing Design and Operation and Introduction
Articles and references given during the course

Assessment methods and criteria:

Continuous assessment during lectures, exercises, seminar, reports, papers review. Major students participate in a seminar peer review as the assessment method.

Grading:

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

Person responsible:

Maria Sinche Gonzalez

Working life cooperation:

No

Other information:

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

477415S: Thermodynamic and process modelling in metallurgy, 5 op

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

ECTS Credits:

5 cr / 135 hours of work.

Language of instruction:

English

Timing:

The course is held in the autumn semester, during periods I and II. It is recommended to complete the course at the 5th autumn semester.

Learning outcomes:

Students passing the course can use computational methods (i.e. HSC Chemistry -software) to investigate the thermodynamic equilibria (e.g. in metallurgy and mineral processing). These thermodynamic considerations include 1) equilibrium calculations, 2) mass and heat balances as well as 3) phase diagrams. Additionally, they can use commercial process simulation software (i.e. HSC Sim -software) to model metallurgical and mineral processes. This means that the student will know how to 1) model flowsheets for various processes, 2) apply simulation in practical problems in mineral processing and 3) run calculation and analyse the results.

Contents:

Course is divided in two parts. Part I focuses on thermodynamic modelling in the contexts of metallurgy and mineral processing: How to use HSC Chemistry as well as its modules (Reaction equations, Equilbrium compositions, Heat & Material balances, H, S, CP, G diagrams, Stability diagrams, Eh-pH diagrams, Measure units, Periodic chart, Species converter) and database? How to define a system? How to interpret results? Part II focuses on general information and exercises in HSC-Sim (Flowsheet simulation -module): HSC-Sim structure and user interface, toolbar, drawing a flowsheets with HSC Sim, data necessary for building up a simulation in mineral processing, structure of HSC Sim Distribution mode, simulation of metallurgical balance. Additionally, it will include general information about HSC Geo and mineral data browser.

Mode of delivery:

Classroom education

Learning activities and teaching methods:

Simulation exercises (work in pairs) supported by the contact-education, which consists of simulation exercises (32 hours of guided work + 16 hours of individual work = total 48 hours). The rest is individual work outside the lectures.

Target group:

Students of process metallurgy and Oulu mining school.

Prerequisites and co-requisites:

Knowledge and skills obtained from the Bachelor-level-studies in engineering or science programme are required as prerequisities. In order to get credits from this course, bachelor thesis must be completed.

Recommended optional programme components:

This course is one of the courses in the module of process metallurgy as well as part of the M.Sc. level studies in Oulu mining school.

Recommended or required reading:

Material will be distributed during the lectures and exercises. Each student is required to search additional material for the exercises when necessary.

Assessment methods and criteria:

Continuous assessment consisting of simulation exercises and reports based on the exercises. Work in pairs. No final exams are organized.

Grading:

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

Person responsible:

university lecturer Eetu-Pekka Heikkinen (part I) and researcher Maria Sinche Gonzalez (part II).

Other information:

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

493607S: Quality requirements for concentrate, 5 op

Voimassaolo: 01.08.2016 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opettajat: Saija Luukkanen

Opintokohteen kielet: English

ECTS Credits:

5 ECTS /133 hours of work

Language of instruction:

English

Timing:

1st year in Master's degree 3rd period

Learning outcomes:

After finishing this course student understands the main quality requirements of the final mineral processing concentrate which effect on further processing in each selected case. The student knows the main economic and technical factors and limitations related to the successful process.

Contents:

Quality requirements for selected concentrates, Distribution of penalty elements in final concentrates, Calculation of Net Smelter Return, Price variation, Typical pricing clauses, Exercises

Learning activities and teaching methods:

Lectures and exercises

Target group:

Mineral processing majors, minor subject students

Prerequisites and co-requisites:

Principles of mineral processing

Recommended optional programme components:

Ore beneficiation technologies

Assessment methods and criteria:

Exam and exercises

Grading:

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

Person responsible:

Saija Luukkanen, Maria Sinche Gonzalez

Working life cooperation:

No

493608S: Development of benefication processes, 10 op

Voimassaolo: 01.08.2016 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: English

ECTS Credits:

10 ECTS /266 hours of work

Language of instruction:

English

Timing:

2^{nd} year in Master's degree 1^{st} and 2^{nd} period

Learning outcomes:

Upon completion of the course student is able to 1) describe the development of the mineral processing chain starting from mineralogy and laboratory scale tests, proceeding to pilot and industrial scale process and 2) describe the essential parameters from process development and optimization points of view. 3) analyse reasons for selection of
processes based on raw material properties 4) develop a process for the selected raw material 5) evaluate the results obtained from the experimental work

Contents:

The course includes both theoretical and practical studies. Characterization of feed material, selection of the process,
optimization of the process in laboratory scale, process scale-up factors, test trials in continuous mode.

Mode of delivery:

Lectures, exercises and practical work in groups

Learning activities and teaching methods:

Lectures and practical work during two periods

Target group:

Mineral processing majors

Prerequisites and co-requisites:

Chemical phenomena in mineral processing, Ore beneficiation technologies, Introduction to ore mineralogy, Requirements for the concentrate

Recommended or required reading:

Wills, B. & Napier-Munn, T. (2006) Wills' Mineral Processing Technology, Elsevier Science & Technology Books, ISBN:
0750644508. Mular, Habe, Barrat; (2002) Mineral processing plant design, practice and control, Vol. 1 and 2, SME Proceedings. Articles and references given during the course.

Assessment methods and criteria:

Continuous evaluation and group exercise

Grading:

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

Person responsible:

Saija Luukkanen, Maria Sinche Gonzalez

Working life cooperation:

No

492603S: Mining Project feasibility study, 5 op

Voimassaolo: 01.08.2016 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opettajat: Saija Luukkanen

Opintokohteen kielet: English

ECTS Credits:

5 ECTS /133 hours of work

Language of instruction:

English

Timing:

1st year in Master's degree, 4th period

Learning outcomes:

After completion of the course the student should be able to understand the content of feasibility study, calculate economical conditions and profitability for mining project, describe and explain differences in feasibility studies of different project stages. The student also understands and is able to evaluate the quality of feasibility studies. This involves addressing the underlying technical principles, applying these to mineral projects and demonstrating how these influence the financial modelling. The student will be able prepare an economical calculation for feasibility study of the mining project and calculate free cash flow to it.

Contents:

Role of different feasibility studies; Guidelines and criteria for resource and reserve classification. Sources of technical information for feasibility study industry-level information; Quality requirements of technical and economical
information; Pre-production planning and optimization of the rate of mining in relation to the size of the resource; Mining methods; Importance of dilution, waste rock ratio, recovery and net smelter return; Estimation of operating and capital costs.

Mode of delivery:

Lectures and exercises

Learning activities and teaching methods:

Lectures and exercises during two periods

Target group:

Mineral processing majors, minor subject students

Prerequisites and co-requisites:

Courses on economy and mining engineering are suggested

Recommended or required reading:

Course materials and literature list will be delivered at the lectures.

Assessment methods and criteria:

Exercises and final exam, or participation to the lectures plus exercises and literature summary

Grading:

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

Working life cooperation:

No

493609S: Mining, environment and society, 5 op

Voimassaolo: 01.08.2016 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: English

ECTS Credits:

5 ECTS /133 hours of work

Language of instruction:

English

Timing:

During period 3

Learning outcomes:

After completion of this course the student is able to develop, apply and assess the targets, practices and methods of
environmentally and socially responsible mining in practice.

Mode of delivery:

Implemented as distance learning

Learning activities and teaching methods:

Lectures and exercises by distance learning & learning diaries.

Target group:

The students of the Mineral Processing study option in the study programmes Process Engineering or Environmental Engineering, etc. and the students of Luleå University of Technology (LTU) within the Nordic Mining School (NMS) agreement between LTU and the University of Oulu.

Prerequisites and co-requisites:

The Bachelor level studies of the process or environmental engineering study programmes or respective knowledge, and the preceding Master level studies or respective knowledge.

Recommended optional programme components:

The other courses of the Master's phase curriculum.

Recommended or required reading:

Lectures + articles delivered during lectures

Assessment methods and criteria:

Participation to the lectures & learning diary.

Grading:

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

Person responsible:

Rauno Sairinen (University of Eastern Finland)

Working life cooperation:

No

491602S: Professional practical training, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Practical training

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English, Finnish

ECTS Credits:

5 ECTS**,** 2 months working full-time

Language of instruction:

Finnish or English

Timing:

Student usually works in summer time during his/her Master's studies.

Learning outcomes:

During the advanced practical training the student get familiarized with the 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.

Contents:

Suitable areas for practical training are, for example, the mining and metallurgical industry and mining projects.

Mode of delivery:

Working as employee

Learning activities and teaching methods:

-

Target group:

Master’s students in Mining Technology and Mineral Processing

Prerequisites and co-requisites:

-

Recommended optional programme components:

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Recommended or required reading:

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Assessment methods and criteria:

Completing the training period plus presenting it orally in a seminar. A job certificate (original referenced) must be shown and an application must be submitted to the seminar supervisor. 491602S Professional Practical Training cannot be substituted with work experience aquiered before starting the studies.

Grading:

Verbal scale Passed/Failed

Person responsible:

Student advisor Marita Puikkonen

Working life cooperation:

Yes

Other information:

The Objective is to give a deeper and more detailed conception of the industrial area where the student will possibly work after graduation. Suitable tasks would be supervision tasks and R&D tasks. Students will find the jobs themselves.

A439128: Mining Engineering, Module of the Option, 0 - 60 op

Voimassaolo: 01.08.2016 -
Opiskelumuoto: Advanced Studies
Laji: Study module
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

Mining Engineering

493301A: Mining geophysics, 5 op

Voimassaolo: 01.08.2016 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opettajat: Elena Kozlovskaya
Opintokohteen kielet: English

ECTS Credits:

5 ECTS /133 hours of work

Language of instruction:

English

Timing:

In first period

Learning outcomes:

The students got familiar with geophysical methods and instrumentation used to solve practical problems arising at al
stages of mine life circle.

Contents:

The course is intended for geophysicists, geologist and mining and rock mechanics engineers working at mines. The basic techniques of applied geophysics are introduced and explained with application to problems of exploration, development, planning, operation, closure and reclamation of open and underground mines. For each method, principles, instrumentation, field procedures, interpretation and case histories are discussed. The students get familiar with the geophysical instrumentation used in specific mining environment. A part of the course is introduction to mining seismology and the modern methods and techniques used to monitor and study seismicity and rock bursts in underground mines.

Target group:

geophysics, geology, mining engineering students

Assessment methods and criteria:

continuous assessment (home work), final exam

Grading:

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

Person responsible:

Elena Kozlovskaya

Working life cooperation:

No

493606S: Mine Geology, 5 op

Voimassaolo: 01.08.2016 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

ECTS Credits:

5 ECTS /133 hours of work

Language of instruction:

English

Timing:

4th year 1stperiod

Learning outcomes:

Upon completion of the course the students should know about the principle activities along the mineral value chain in the mining environment (exploration, mining, mineral processing, environmental management). The course is given at the active Pyhäsalmi mine to optimize interaction with professionals and working live experience.

Contents:

Based on the processes in an active mine environment (Pyhäsalmi mine) various aspects of the development and operation of mines will be investigated. This includes the ore exploration and mine development, rock mechanics and mining technologies, mineral processing principles, and environmental management. Face to face teaching and mine visit

Mode of delivery:

Face to face teaching and mine visit

Learning activities and teaching methods:

Lectures, interaction with professionals at the Pyhäsalmi mine, and exercises (e.g. drill core logging).

Target group:

Masters students in the mining engineering and mineral processing study programme (compulsory course) and Masters students in Geosciences (optional course to fulfill the obligation of 10 ECTS in mining engineering and mineral processing study programme courses)

Prerequisites and co-requisites:

Introduction to Geology I and II; Basic course in mineralogy; Principles of mineral processing, Rock mechanics (BSc level courses) or completed BSc degree

Recommended optional programme components:

493301A Mining geophysics
774636S Geochemistry of mining environment
772632S Regional Ore Geology of Fennoscandia
772694S Geometallurgy and mineral processing

Recommended or required reading:

Abzalov, M. (2016) Applied Mining Geology, Springer, Modern approaches in solid Earth sciences 12, 448 p

Assessment methods and criteria:

Learning diary and report

Grading:

pass/fail

Person responsible:

Holger Paulick, Zongxian Zhang

Working life cooperation:

Course will be conducted in co-operation with partners from the Pyhäsalmi mine.

Other information:

Location of instruction is Pyhäsalmi mine

772694S: Geometallurgy and mineral processing, 5 op

Voimassaolo: 01.08.2012 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opettajat: Pertti Lamberg
Opintokohteen kielet: English

ECTS Credits:

5 credits

Language of instruction:

English

Timing:

4th or 5th year

Learning outcomes:

Upon completion of the course students should be able to: 1) Describe the principles of different areas of Geometallurgy (ore geology, process mineralogy, minerals processing, modeling and simulation) and how they are linked in a geometallurgical concept. 2) Use different research and analytical methods of importance for Geometallurgy and interpret the results. 3) Evaluate, analyze and interpret the geometallurgical data in a quantitative way. 4) Design a geometallurgical sampling, analysis and research campaign. 5) Design a geometallurgical program.

Contents:

The course will introduce main parts of the Geometallurgy: 1) ore geology, 2) process mineralogy and 3) minerals processing. The focus is in process mineralogy, mineral processing and in assimilating the geo-metallurgical concept. Exercises, assignments and seminars concentrate on practical aspects of Geometallurgy needed in mining industry.

Mode of delivery:

Face to face

Learning activities and teaching methods:

Lectures and PC classes with assignments 33 h.

Target group:

geology majors, minor subject students. Prerequisites and co-requisites: Ore geology (772385A), Introduction to Ore mineralogy (772335A).

Prerequisites and co-requisites:

Ore geology (772385A), Ore microscopy (772335A).

Recommended optional programme components:

ü Petruk, W. (2000) Applied Mineralogy in the Mining Industry, Elsevier Science B.V., Amsterdam.
ü Wills, B. & Napier-Munn, T. (2006) Wills' Mineral Processing Technology, Elsevier Science & Technology Books, ISBN: 0750644508.
ü Becker et al. (2016) Process Mineralogy, JKMRC Monograph Series in Mining and Mineral Processing: No. 6, ISBN: 978-1-74272-171-2

Recommended or required reading:

Petruk, W. (2000). Applied Mineralogy in the Mining Industry, Elsevier Science B.V., Amsterdam.
Will, B. & Napier-Munn, T. (2006) Wills' Mineral Processing Technology, Elsevier Science & Technology Books, ISBN: 0750644508.

The availability of the literature can be checked from this link.

Assessment methods and criteria:

Laboratory classes, Geometallurgical investigations (for the seminar) and the seminars are compulsory. Seminars, the investigation and the opposition are each awarded points based on the attained level. Assignments and reports must be delivered in time or there will be an automatic deduction of points. The total points production determines the grand grade of the course, and it is given on the scale Fail-1-5.
. For grade 1, the student must be able to describe different parts and procedures of Geometallurgy and to conduct a routine geometallurgical analysis.
. For grade 2, the student must be able to collect geometallurgical data and perform an analysis with interpretation.
. For grade 3 the student must be able to evaluate and interpret geometallurgical data provided by different analytical and research techniques and to report the results.
. For grade 4, the student must be able to design geometallurgical campaign, interpret the result and establish a geometallurgical program.
. For grade 5, the student must be able to apply the acquired skills to a new geometallurgical case, interpret, report and present the results and to defend the conclusions.

Grading:

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

Person responsible:

Jussi Liipo

Working life cooperation:

No

492607S: Stress wave theory and applications, 5 op

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opettajat: Zongxian Zhang
Opintokohteen kielet: English

ECTS Credits:

5 ECTS /133 hours of work

Language of instruction:

English

Timing:

1st year 1st period

Learning outcomes:

Upon completion of the course students should: (1) know the basic theory on shock waves; (2) understand stress wave theory, especially one-dimensional elastic wave theory; (3) be able to apply some shock wave principles to civil engineering, particularly rock engineering; (4) be able to apply stress wave theory to general engineering practices such as rock drilling, rock blasting, rock support (especially dynamic rock support), excavation/tunnelling, testing or measuring dynamic behaviour or properties of general solids, controlling or reducing vibrations, safety engineering, material development, and other applications in rock and mining engineering.

Contents:

The course will: (1) introduce basic characteristics of shock waves and stress waves; (2) introduce shock wave collision and its applications in engineering; (3) present basic theory on stress waves, focusing on one-dimensional waves; (4) introduce wave reflection and transmission; (5) introduce spalling theory and its engineering applications; (6) present wave attenuation and dispersion in solids, focusing on rock mass; (7) introduce typical examples from engineering, focusing on rock, mining and mineral processing.

Mode of delivery:

Face to face

Learning activities and teaching methods:

Lectures, seminars, written reports, and assignments (lab testing if the instruments are ready).

Target group:

Students from civil engineering, material science, mechanical engineering, mining and mineral processing, geophysics and geology

Prerequisites and co-requisites:

Bachelor degree in engineering such as civil engineering, mining or mineral processing or geology.

Recommended optional programme components:

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Recommended or required reading:

Book used in teaching:
Zhang ZX. Rock fracture and blasting: theory and applications. Oxford: Elsevier, 2016 (Chapters 1 and 2 will be main contents for teaching, and some other chapters are for reading only).

Recommended materials to read:
Kolsky H. Stress waves in solids. New York: Dover Publications; 1963.
Johnson W. Impact strength of materials. London: Edward Arnold; 1972.

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 wave analysis.
• For grade 3 the student must be able to use the theory to analyse a problem related to stress waves.
• For grade 4, the student must be able to solve a problem by using the theory.
• For grade 5, the student must be able to apply the acquired knowledge to solve a wave problem and to do improvement on a current practical operation is it is not perfect design.

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:

-

492600S: Mining Engineering, 10 op

Voimassaolo: 01.08.2016 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opettajat: Zongxian Zhang
Opintokohteen kielet: English

ECTS Credits:

10 ECTS /266 hours of work

Language of instruction:

English

Timing:

Spring term of the 4th academic year

Learning outcomes:

Upon completion of the course students should be able to: 1) use the knowledge of rock mechanics, rock drilling and blasting to make mining planning and mine designs; 2) perform better operations or improve current operations in drilling, blasting, extraction, tunnelling, and comminution; 3) understand the effect of ore recovery on mining economy and resource recovery; 4) gain knowledge on how to improve recovery; 5) gain the knowledge of reducing the damage to the environment due to mining activities.

Contents:

The course will first give a compact introduction to basic rock mechanics, rock drilling, rock blasting and ventilation, and then introduce basic principles for mining planning and operation design such as development and different excavations. After these, the course will introduce each mining method in detail, including mass mining methods such as sublevel caving and block caving and other common mining methods such as cut-and-fill, room-and-pillar, shrinkage, open stope, etc. In the last part of the course, mining economy related to mining operation and mining technology will be discussed, optimum fragmentation aiming to save energy will be described, and then vibration control will be introduced.

Mode of delivery:

Face to face

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

Prerequisites and co-requisites:

Bachelor degree in mining or mineral processing or geology or other civil engineering.

Recommended optional programme components:

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Recommended or required reading:

Recommended materials to read:

Zhang ZX. Mining Science and Technology. Compendium for course Mining Technology, University of Oulu, 2017.

Hamrin H. Underground mining methods and applications. In: Underground mining methods—engineering fundamentals and international case studies, eds. By WA Hustrulid and RL Bullock. Littleton (Colorado): Society for mining, metallurgy, and exploration, Inc, (SME), 2001, p.3-14.

Hustrulid WA, Bullock RL. Underground mining methods—engineering fundamentals and international case studies. Littleton (Colorado): Society for mining, metallurgy, and exploration, Inc, (SME), 2001.

Vergne J. Hard Rock Miner's Handbook, Edition 5. Edmonton: Stantec Consulting Ltd, 2008.

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 a preliminary plan for mining and rock support by using the knowledge in rock mechanics and mining science.
• For grade 3 the student must be able to make a plan for mining and rock support and evaluate such a plan
• For grade 4, the student must be able to make a plan for mining and rock support and evaluate such a plan. In addition, the student should be able to improve any current plan for mining and rock support by using his/her knowledge in mining science.
• For grade 5, the student must be able to apply the acquired knowledge to make a very good plan for mining and rock support. He or she must do an outstanding design in at least one aspect, e.g. he/she can find a problem in one operation or one design 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

492608S: Rock blasting, 5 op

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opettajat: Zongxian Zhang
Opintokohteen kielet: English

Ei opintojaksokuvauksia.

492602S: Financial and Project valuation of mining, 5 op

Voimassaolo: 01.08.2016 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: English

ECTS Credits:

5 ECTS /133 hours of work

Language of instruction:

English

Timing:

4th year 2nd period

Learning outcomes:

After completion of the course the student should be able to understand how to finance a mining project. What are requirements of venture capital financing and other type of financing? What are the sources of mining financing and how to seek financing? What are the sources of financing? The student understands the importance of cash flow, NPV and IRR calculations. The student will even understand what kind of parameters impacts the value of a mining project. The aim of the course is to provide a guide to understanding the main factors involved in financing of mining projects through equity and debt. The student will be able to prepare a simple valuation model of exploration properties and companies.

Contents:

Different tools for analyzing financial information, problems in analyzing financial information, and the use of financial and mineral resource information in project valuation.

Mode of delivery:

Face to face teaching

Learning activities and teaching methods:

Lectures 24 hr

Target group:

Master/ mining technology

Prerequisites and co-requisites:

Courses on economy and mining engineering, and course "Mining project – feasibility study" are suggested

Recommended optional programme components:

-

Recommended or required reading:

Course materials and literature list will be delivered at the lectures

Assessment methods and criteria:

Exercises and final exam, or participation to the lectures plus exercises and literature summary

Grading:

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

Person responsible:

Prof. Timo Lindborg

Working life cooperation:

No

Other information:

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492603S: Mining Project feasibility study, 5 op

Voimassaolo: 01.08.2016 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opettajat: Saija Luukkanen
Opintokohteen kielet: English

ECTS Credits:

5 ECTS /133 hours of work

Language of instruction:

English

Timing:

1st year in Master's degree, 4th period

Learning outcomes:

After completion of the course the student should be able to understand the content of feasibility study, calculate economical conditions and profitability for mining project, describe and explain differences in feasibility studies of different project stages. The student also understands and is able to evaluate the quality of feasibility studies. This involves addressing the underlying technical principles, applying these to mineral projects and demonstrating how these influence the financial modelling. The student will be able prepare an economical calculation for feasibility study of the mining project and calculate free cash flow to it.

Contents:

Role of different feasibility studies; Guidelines and criteria for resource and reserve classification. Sources of technical information for feasibility study industry-level information; Quality requirements of technical and economical
information; Pre-production planning and optimization of the rate of mining in relation to the size of the resource; Mining methods; Importance of dilution, waste rock ratio, recovery and net smelter return; Estimation of operating and capital costs.

Mode of delivery:

Lectures and exercises

Learning activities and teaching methods:

Lectures and exercises during two periods

Target group:

Mineral processing majors, minor subject students

Prerequisites and co-requisites:

Courses on economy and mining engineering are suggested

Recommended or required reading:

Course materials and literature list will be delivered at the lectures.

Assessment methods and criteria:

Exercises and final exam, or participation to the lectures plus exercises and literature summary

Grading:

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

Working life cooperation:

No

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

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.

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:

university teacher Raimo Hannila, LSc (tech.)

493609S: Mining, environment and society, 5 op

Voimassaolo: 01.08.2016 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

ECTS Credits:

5 ECTS /133 hours of work

Language of instruction:

English

Timing:

During period 3

Learning outcomes:

After completion of this course the student is able to develop, apply and assess the targets, practices and methods of
environmentally and socially responsible mining in practice.

Mode of delivery:

Implemented as distance learning

Learning activities and teaching methods:

Lectures and exercises by distance learning & learning diaries.

Target group:

The students of the Mineral Processing study option in the study programmes Process Engineering or Environmental Engineering, etc. and the students of Luleå University of Technology (LTU) within the Nordic Mining School (NMS) agreement between LTU and the University of Oulu.

Prerequisites and co-requisites:

The Bachelor level studies of the process or environmental engineering study programmes or respective knowledge, and the preceding Master level studies or respective knowledge.

Recommended optional programme components:

The other courses of the Master's phase curriculum.

Recommended or required reading:

Lectures + articles delivered during lectures

Assessment methods and criteria:

Participation to the lectures & learning diary.

Grading:

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

Person responsible:

Rauno Sairinen (University of Eastern Finland)

Working life cooperation:

No

491602S: Professional practical training, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Practical training

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English, Finnish

ECTS Credits:

5 ECTS**,** 2 months working full-time

Language of instruction:

Finnish or English

Timing:

Student usually works in summer time during his/her Master's studies.

Learning outcomes:

During the advanced practical training the student get familiarized with the 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.

Contents:

Suitable areas for practical training are, for example, the mining and metallurgical industry and mining projects.

Mode of delivery:

Working as employee

Learning activities and teaching methods:

-

Target group:

Master’s students in Mining Technology and Mineral Processing

Prerequisites and co-requisites:

-

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Completing the training period plus presenting it orally in a seminar. A job certificate (original referenced) must be shown and an application must be submitted to the seminar supervisor. 491602S Professional Practical Training cannot be substituted with work experience aquiered before starting the studies.

Grading:

Verbal scale Passed/Failed

Person responsible:

Student advisor Marita Puikkonen

Working life cooperation:

Yes

Other information:

The Objective is to give a deeper and more detailed conception of the industrial area where the student will possibly work after graduation. Suitable tasks would be supervision tasks and R&D tasks. Students will find the jobs themselves.

A439131: Module of the Option, Applied Geophysics, 60 op

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Advanced Studies
Laji: Study module
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

Applied Geophysics

493301A: Mining geophysics, 5 op

Voimassaolo: 01.08.2016 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opettajat: Elena Kozlovskaya
Opintokohteen kielet: English

ECTS Credits:

5 ECTS /133 hours of work

Language of instruction:

English

Timing:

In first period

Learning outcomes:

The students got familiar with geophysical methods and instrumentation used to solve practical problems arising at al
stages of mine life circle.

Contents:

The course is intended for geophysicists, geologist and mining and rock mechanics engineers working at mines. The basic techniques of applied geophysics are introduced and explained with application to problems of exploration, development, planning, operation, closure and reclamation of open and underground mines. For each method, principles, instrumentation, field procedures, interpretation and case histories are discussed. The students get familiar with the geophysical instrumentation used in specific mining environment. A part of the course is introduction to mining seismology and the modern methods and techniques used to monitor and study seismicity and rock bursts in underground mines.

Target group:

geophysics, geology, mining engineering students

Assessment methods and criteria:

continuous assessment (home work), final exam

Grading:

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

Person responsible:

Elena Kozlovskaya

Working life cooperation:

No

494601S: Electrical and EM-methods I, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opettajat: Moisio, Kari Juhani

Opintokohteen kielet: English

ECTS Credits:

5 ECTS / 133 hours of work

Language of instruction:

Finnish/English

Timing:

Every 2nd year (odd years) on autumn semester, period 1. Recommended at 1st or 2nd year of the Master' s studies.

Learning outcomes:

Upon completion of the course student will be able to explain the basis of the electrical resistivity methods, theory, application and usage and knows how to adapt, analyse and interpretate measured data from different methods in order to investigate near surface structure.

Contents:

The basic concepts of the electrical resistivity methods, their theoretical background and adaptation to the investigation of near surface structure.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures and exercises 40 h, independent work and self study.

Target group:

Students of the Oulu Mining School and those interested in electrical research methods.

Prerequisites and co-requisites:

No specific prerequisites

Recommended optional programme components:

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

Recommended or required reading:

Lecture materials

Assessment methods and criteria:

Variable grading and evaluation methods

Grading:

1-5/fail

Person responsible:

Kari Moisio

Working life cooperation:

No

Other information:

-

494602S: Electrical and EM-methods II, 5 op

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opettajat: Elena Kozlovskaya
Opintokohteen kielet: English

Ei opintojaksokuvauksia.

494603S: GIS applications, 5 op

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opettajat: Moisio, Kari Juhani
Opintokohteen kielet: English

ECTS Credits:

5 credits

Language of instruction:

English

Timing:

4th or 5th autumn

Learning outcomes:

After the course, students can can use GIS-software, he can identify, apply and modify different types of spatial data and analyze them with spatial analysis tools. He can also create understandable and clear visual presentations from the spatial data.

Contents:

This course focuses more on the capabilities of the GIS-software and the possibilities they offer in presenting and analyzing spatial data in practical exercises.

Mode of delivery:

Face to face teaching and exercises.

Learning activities and teaching methods:

Lectures and practicals totalling 30 h, plus independent study. Course is passed by returning exercise reports

Target group:

Students of Oulu Mining School and Faculties of science and technology etc

Prerequisites and co-requisites:

Course GIS and spatial data 1 or equivalent, basics of GIS

Recommended optional programme components:

-

Recommended or required reading:

Will be informed separately.

Assessment methods and criteria:

Assessment is based on the evaluation of the written reports of exercises

Grading:

Numerical grading scale 0 – 5, where 0 = fail

Person responsible:

Kari Moisio

Working life cooperation:

No

Other information:

-

494604S: Seismic soundings, 5 op

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opettajat: Moisio, Kari Juhani
Opintokohteen kielet: English

ECTS Credits:

5 ECTS credits

Language of instruction:

Finnish/English

Timing:

Spring semester, period 4. Recommended at 1st or 2nd year of the Master's studies.

Learning outcomes:

Upon completion of the course student will be able to use and adapt seismic methods in studying the structure of the bedrock and soil. Student can explain and justify theoretical background of the seismic methods, and the limitations and error sources involved in them. Student can also make measurements in the field, produce seismic data, interpretate and analyse it and summarize the results.

Contents:

The basic concepts of seismic refraction and reflection soundings and surface wave methods and their interpretation. Physical background of the seismic methods, theory, interpretation and processing methods together with field measurement layouts.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures and exercises 40 h, independent work and self study.

Target group:

Students of the Oulu Mining School and those interested in seismic research methods.

Prerequisites and co-requisites:

No specific prerequisites

Recommended optional programme components:

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

Recommended or required reading:

Lecture materials

Assessment methods and criteria:

Variable grading and evaluation methods

Grading:

1-5/fail

Person responsible:

Kari Moisio

Working life cooperation:

No working life cooperation

Other information:

-

494605S: Potential fields and airborne geophysics I, 5 op

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opettajat: Moisio, Kari Juhani
Opintokohteen kielet: English

ECTS Credits:

5 ECTS credits

Language of instruction:

Finnish/English

Timing:

Autumn semester every other year (odd years), period 1. Recommended at 1st or 2nd year of the Master's studies.

Learning outcomes:

Upon completion of the courses tudent identifies the special characteristics of airborne geophysical measurements and knows how to process and interpret airborne geophysical data. In addition student can explain the major physical properties of rocks and rock forming minerals and their mutual dependence.

Contents:

The course provides basic knowledge on airborne geophysical investigation methods and also on the petrophysical properties of rocks and minerals. Course focuses on the airborne geophysical mapping made by the Geological Survey of Finland including magnetic, electromagnetic and radiometric measurements, and their characteristics. On behalf of petrophysics the physical properties of rocks and minerals including density, magnetic, elastic, electric, thermal and radiometric properties are considered.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures and exercises 40 h, independent work and self study.

Target group:

Students of the Oulu Mining School and those interested in airborne geophysics and petrophysics.

Prerequisites and co-requisites:

No specific prerequisites

Recommended optional programme components:

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

Recommended or required reading:

Lecture materials

Assessment methods and criteria:

Variable grading and evaluation methods

Grading:

1-5/fail

Person responsible:

Kari Moisio

Working life cooperation:

No working life cooperation

Other information:

-

494606S: Potential fields and airborne geophysics II, 5 op

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opettajat: Elena Kozlovskaya
Opintokohteen kielet: English

Ei opintojaksokuvauksia.

493606S: Mine Geology, 5 op

Voimassaolo: 01.08.2016 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: English

ECTS Credits:

5 ECTS /133 hours of work

Language of instruction:

English

Timing:

4^{th} year 1^{st}period

Learning outcomes:

Upon completion of the course the students should know about the principle activities along the mineral value chain in the mining environment (exploration, mining, mineral processing, environmental management). The course is given at the active Pyhäsalmi mine to optimize interaction with professionals and working live experience.

Contents:

Based on the processes in an active mine environment (Pyhäsalmi mine) various aspects of the development and operation of mines will be investigated. This includes the ore exploration and mine development, rock mechanics and mining technologies, mineral processing principles, and environmental management. Face to face teaching and mine visit

Mode of delivery:

Face to face teaching and mine visit

Learning activities and teaching methods:

Lectures, interaction with professionals at the Pyhäsalmi mine, and exercises (e.g. drill core logging).

Target group:

Masters students in the mining engineering and mineral processing study programme (compulsory course) and Masters students in Geosciences (optional course to fulfill the obligation of 10 ECTS in mining engineering and mineral processing study programme courses)

Prerequisites and co-requisites:

Introduction to Geology I and II; Basic course in mineralogy; Principles of mineral processing, Rock mechanics (BSc level courses) or completed BSc degree

Recommended optional programme components:

493301A Mining geophysics
774636S Geochemistry of mining environment
772632S Regional Ore Geology of Fennoscandia
772694S Geometallurgy and mineral processing

Recommended or required reading:

Abzalov, M. (2016) Applied Mining Geology, Springer, Modern approaches in solid Earth sciences 12, 448 p

Assessment methods and criteria:

Learning diary and report

Grading:

pass/fail

Person responsible:

Holger Paulick, Zongxian Zhang

Working life cooperation:

Course will be conducted in co-operation with partners from the Pyhäsalmi mine.

Other information:

Location of instruction is Pyhäsalmi mine

492603S: Mining Project feasibility study, 5 op

Voimassaolo: 01.08.2016 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opettajat: Saija Luukkanen
Opintokohteen kielet: English

ECTS Credits:

5 ECTS /133 hours of work

Language of instruction:

English

Timing:

1st year in Master's degree, 4th period

Learning outcomes:

After completion of the course the student should be able to understand the content of feasibility study, calculate economical conditions and profitability for mining project, describe and explain differences in feasibility studies of different project stages. The student also understands and is able to evaluate the quality of feasibility studies. This involves addressing the underlying technical principles, applying these to mineral projects and demonstrating how these influence the financial modelling. The student will be able

prepare an economical calculation for feasibility study of the mining project and calculate free cash flow to it.

Contents:

Role of different feasibility studies; Guidelines and criteria for resource and reserve classification. Sources of technical information for feasibility study industry-level information; Quality requirements of technical and economical
information; Pre-production planning and optimization of the rate of mining in relation to the size of the resource; Mining methods; Importance of dilution, waste rock ratio, recovery and net smelter return; Estimation of operating and capital costs.

Mode of delivery:

Lectures and exercises

Learning activities and teaching methods:

Lectures and exercises during two periods

Target group:

Mineral processing majors, minor subject students

Prerequisites and co-requisites:

Courses on economy and mining engineering are suggested

Recommended or required reading:

Course materials and literature list will be delivered at the lectures.

Assessment methods and criteria:

Exercises and final exam, or participation to the lectures plus exercises and literature summary

Grading:

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

Working life cooperation:

No

493609S: Mining, environment and society, 5 op

Voimassaolo: 01.08.2016 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: English

ECTS Credits:

5 ECTS /133 hours of work

Language of instruction:

English

Timing:

During period 3

Learning outcomes:

After completion of this course the student is able to develop, apply and assess the targets, practices and methods of
environmentally and socially responsible mining in practice.

Mode of delivery:

Implemented as distance learning

Learning activities and teaching methods:

Lectures and exercises by distance learning & learning diaries.

Target group:

The students of the Mineral Processing study option in the study programmes Process Engineering or Environmental Engineering, etc. and the students of Luleå University of Technology (LTU) within the Nordic Mining School (NMS) agreement between LTU and the University of Oulu.

Prerequisites and co-requisites:

The Bachelor level studies of the process or environmental engineering study programmes or respective knowledge, and the preceding Master level studies or respective knowledge.

Recommended optional programme components:

The other courses of the Master's phase curriculum.

Recommended or required reading:

Lectures + articles delivered during lectures

Assessment methods and criteria:

Participation to the lectures & learning diary.

Grading:

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

Person responsible:

Rauno Sairinen (University of Eastern Finland)

Working life cooperation:

No

492602S: Financial and Project valuation of mining, 5 op

Voimassaolo: 01.08.2016 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: English

ECTS Credits:

5 ECTS /133 hours of work

Language of instruction:

English

Timing:

4th year 2nd period

Learning outcomes:

After completion of the course the student should be able to understand how to finance a mining project. What are requirements of venture capital financing and other type of financing? What are the sources of mining financing and how to seek financing? What are the sources of financing? The student understands the importance of cash flow, NPV and IRR calculations. The student will even understand what kind of parameters impacts the value of a mining project. The aim of the course is to provide a guide to understanding the main factors involved in financing of mining projects through equity and debt. The student will be able to prepare a simple valuation model of exploration properties and companies.

Contents:

Different tools for analyzing financial information, problems in analyzing financial information, and the use of financial and mineral resource information in project valuation.

Mode of delivery:

Face to face teaching

Learning activities and teaching methods:

Lectures 24 hr

Target group:

Master/ mining technology

Prerequisites and co-requisites:

Courses on economy and mining engineering, and course "Mining project – feasibility study" are suggested

Recommended optional programme components:

-

Recommended or required reading:

Course materials and literature list will be delivered at the lectures

Assessment methods and criteria:

Exercises and final exam, or participation to the lectures plus exercises and literature summary

Grading:

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

Person responsible:

Prof. Timo Lindborg

Working life cooperation:

No

Other information:

-

491602S: Professional practical training, 5 op

Voimassaolo: 01.08.2015 -
Opiskelumuoto: Advanced Studies
Laji: Practical training
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: English, Finnish

ECTS Credits:

5 ECTS**,** 2 months working full-time

Language of instruction:

Finnish or English

Timing:

Student usually works in summer time during his/her Master's studies.

Learning outcomes:

During the advanced practical training the student get familiarized with the 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.

Contents:

Suitable areas for practical training are, for example, the mining and metallurgical industry and mining projects.

Mode of delivery:

Working as employee

Learning activities and teaching methods:

-

Target group:

Master’s students in Mining Technology and Mineral Processing

Prerequisites and co-requisites:

-

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Completing the training period plus presenting it orally in a seminar. A job certificate (original referenced) must be shown and an application must be submitted to the seminar supervisor. 491602S Professional Practical Training cannot be substituted with work experience aquiered before starting the studies.

Grading:

Verbal scale Passed/Failed

Person responsible:

Student advisor Marita Puikkonen

Working life cooperation:

Yes

Other information:

The Objective is to give a deeper and more detailed conception of the industrial area where the student will possibly work after graduation. Suitable tasks would be supervision tasks and R&D tasks. Students will find the jobs themselves.

491601S: Master's thesis, 30 op

Voimassaolo: 01.08.2016 -
Opiskelumuoto: Advanced Studies
Laji: Diploma thesis
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: English, Finnish

ECTS Credits:
30 cr
Language of instruction:
Finnish or English
Timing:
Spring term of the 5th academic year

491600S: Maturity test, 0 op

Voimassaolo: 01.08.2016 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish, English

Ei opintojaksokuvauksia.

A439105: Basic and Intermediate Studies, Mining Engineering and Mineral Processing, 100 op

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Basic and Intermediate Studies
Laji: Study module
Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

Compulsory

491100P: Orientation to OMS studies, 1 op

Voimassaolo: 01.08.2015 -
Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opettajat: Kirsi *Marita Puikkonen
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 studies of his /her degree programme in the Oulu Mining School.

Contents:

Issues related to the beginning of the studies. Goals, structure and contents of the studies in the Oulu Mining School. Preparing a personal study plan. Study technique and the using 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 Mining Technology and Mineral Processing

Prerequisites and co-requisites:

-

Recommended optional programme components:

-

Recommended or required reading:

Study guide,Teekkarin työkirja

Assessment methods and criteria:

Participation to the tutorials and information sessions and doing the personal study plan. The student has to participate in orientation and two topic lectures (Ajankäyttö ja suunnitelmallinen opiskelu, Oppiminen on taitolaji).

Grading:

Verbal scale Passed/Failed

Person responsible:

Student Advisor Marita Puikkonen, Mining Engineering and Mineral Processing

Working life cooperation:

No

Other information:

-

491101P: Introduction to mining, 5 op

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opettajat: Saija Luukkanen
Opintokohteen kielet: Finnish

Recommended or required reading:

lopputentti, harjoitukset, aktiivisuus

031010P: Calculus I, 5 op

Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Applied Mathematics and Computational Mathematics
Arvostelu: 1 - 5, pass, fail
Opettajat: 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 1-5. In the numerical scale zero stands for a fail.

Person responsible:

Ilkka Lusikka

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: Ilkka Lusikka
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, 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 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 1-5. 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

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:

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

Recommended optional programme components:

-

Recommended or required reading:

Recommented 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.
Lue lisää opintosuoritusten arvostelusta yliopiston verkkosivulta.

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:

-

Other information:

-

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:

-

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:

-

Other information:

-

031022P: Numerical Analysis, 5 op

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

ECTS Credits:

5 ECTS credits / 135 hours of work

Language of instruction:

Finnish. English speaking students should contact the instructor.
The course can be completed in English by intermediate exams or by a final exam.

Timing:

Spring semester, period 3

Learning outcomes:

Knows numerical algorithms for solving basic problems in computing. Knows basics about numerical linear algebra and some of its applications. Knows how nonlinear systems are solved and how they appear in optimization. Knows how differential equations are solved numerically.

Contents:

Numerical linear algebra, numerical methods for systems of equations, unconstrained optimization, basics of the approximation theory, numerical quadratures, numerical methods for ordinary differential equations.

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:

Completion of courses Calculus I and II, a course on Differential Equations and a Course on Linear Algebra.

Recommended optional programme components:

-

Recommended or required reading:

Material posted on the web-page of the course.

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 1-5. In the numerical scale zero stands for a fail.

Person responsible:

Marko Huhtanen

Working life cooperation:

-

Other information:

-

761113P: Electricity and magnetism, 5 op

Voimassaolo: 01.01.2015 -
Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Field of Physics
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish
Leikkaavuudet:

761119P	Electromagnetism 1	5.0 op
761119P-01	Electromagnetism 1, lectures and exam	0.0 op
761119P-02	Electromagnetism 1, lab. exercises	0.0 op
766319A	Electromagnetism	7.0 op
761103P	Electricity and Magnetism	4.0 op

ECTS Credits:

5 ECTS cr

Language of instruction:

Finnish

Timing:

Spring

Learning outcomes:

The student is able to describe the basic concepts of electricity and magnetism and to apply those when solving the problems related to electromagnetism.

Contents:

Electromagnetic interaction is one of the four fundamental interactions in physics and many phenomena like light, radio waves, electric current, magnetism and formation of solid matter are based on electromagnetism. The current technological development is largely based on applications of electromagnetism in energy production and transfer, telecommunications and information technology.
Contents in brief: Coulomb's law. Electric field and potential. Gauss's law. Capacitors and dielectrics. Electric current, resistors, electromotive force and DC circuits. Magnetic field, motion of a charged particle in electric and magnetic fields, and applications. Ampère's law and Biot-Savart law. Electromagnetic induction and Faraday's law. Inductance and inductors. R-L-C circuits, alternating current and AC circuits.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 30 h, 6 exercises (12 h), 2 laboratory exercises (8 h), 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 are needed.

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, 13th edition, 2012, chapters 21-31. Also older editions can be used.
Lecture material: Finnish lecture material will be available on the web page of the course.
Course material availability can be checked here.

Assessment methods and criteria:

Four written intermediate examinations or final examination.
Read more about assessment criteria at the University of Oulu webpage.

Grading:

Numerical grading scale 0 – 5, where 0 = fail

Person responsible:

Timo Asikainen

Working life cooperation:

No work placement period

Other information:

https://wiki.oulu.fi/display/761113P/

780120P: Basic Principles in Chemistry, 5 op

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

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

ECTS Credits:

5 credits/134 hours of work

Language of instruction:

Finnish

Timing:

1st autumn

Learning outcomes:

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

Contents:

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

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

40 hours of lectures and 94 hours of self-study

Target group:

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

Prerequisites and co-requisites:

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

Recommended optional programme components:

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

Recommended or required reading:

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

Assessment methods and criteria:

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

Grading:

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

Person responsible:

Lecturer Minna Tiainen

Working life cooperation:

No

Other information:

No

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

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; electrical engineering 3. spring semester, period III; geosciences 2. spring semester, period IV;

geography 1. and 3. spring semester, *period III;* industrial engineering and management 3. year*;* information processing sciences 1. year; mathematics and physics 1. spring semester; mechanical engineering 3. year; mining engineering and mineral processing 3. year; process and environmental engineering 1. year, period I. Master's degree students in Industrial Engineering and Management 1st year.

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, Oulu mining school, Oulu School of architecture and Faculty of science. Optional for students of biochemistry. Compulsory also for the Master's degree students in Industrial Engineering and Management who have not earlier studies in information skills.

Prerequisites and co-requisites:

-

Recommended optional programme components:

-

Recommended or required reading:

Web learning material Tieteellisen tiedonhankinnan opas http://libguides.oulu.fi/tieteellinentiedonhankinta

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:

-

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), Faculty of Information Technology and Electrical Engineering (TST), and Oulu Mining School (KaTk).

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,
- formulate strategies for developing your English-language communication skills based on an evaluation of your own strengths and weaknesses.

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 develop an idea for a new product or service and devise a business plan, 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 / team work 22 hours / independent work 7 hours. Lessons include regular pair and group work in class. Team work includes the preparation of four short presentations (22 hours). Independent homework activities include an online vocabulary test (3 hours) and other small assignments (5 hours). Active participation is essential.

Target group:

Students in the engineering programmes: TTK (PO1, YMP1, KO1, TuTa1), TST (ST2, CSE2) and OMS1.

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. Students must achieve a grade of 75% in the online vocabulary test.
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:

-

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

488142A: Environmental legislation and EIA, 5 op

Voimassaolo: 28.11.2016 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Field of Process and Environmental Engineering
Arvostelu: 1 - 5, pass, fail
Opettajat: Anna-Kaisa Ronkanen
Opintokohteen kielet: Finnish
Leikkaavuudet:

454541A Built Environment 5.0 op
485022A Fundamentals of built environment 5.0 op

Ei opintojaksokuvauksia.

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: Eero Hanski
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

Ei opintojaksokuvauksia.

Compulsory

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

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Basic Studies
Laji: Partial credit
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opettajat: Pekka Tuisku
Opintokohteen kielet: Finnish
Voidaan suorittaa useasti: Kyllä

Ei opintojaksokuvauksia.

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

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Basic Studies
Laji: Partial credit
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opettajat: Jukka-Pekka Ranta
Opintokohteen kielet: Finnish
Voidaan suorittaa useasti: Kyllä

Ei opintojaksokuvauksia.

774311A: A Basic Course in Geochemistry, 5 op

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS

Language of instruction:

The language of instruction is Finnish. The course can also be completed in English as a book examination.

Timing:

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

Learning outcomes:

Upon completion of this course, the student will:

have a broad overview of the different fields of geochemistry, be able to relate the behaviour of elements to different physico-chemical processes in nature
be able to convert geochemical data from one form to another (wt.%, molar and cation proportions, milliequivalents)

can plot geochemical data on different diagramscan carry out simple mineral dissolution/precipitation and mass balance calculations.

Contents:

Geochemistry as a field of science; history of geochemistry; tasks and fields of geochemistry; origin and electron configuration of chemical elements; origins and structure of the Earth; meteorites; the geochemical classification of the elements; composition of earth's different spheres; geochemical differentiation; composition of magmas; dissolution and precipitation of minerals; pH-Eh-diagrams; introduction to isotope geochemistry.

Mode of delivery:

Face to face teaching.

Learning activities and teaching methods:

32 h lectures, 12 h exercises.

Target group:

All students in geosciences and mineral processing and mining technology.

Prerequisites and co-requisites:

A basic course in chemistry

Recommended optional programme components:

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

Recommended or required reading:

Gill, Robin (1996) Chemical Fundamentals of Geology, Chapman & Hall, London, 298 p. Additional material will be given during the lectures.
You can check the availability of the course book via this link.

Assessment methods and criteria:

Examination in both theory and calculations.

Grading:

The course utilizes a numerical grading scale 1-5. The grade is calculated as the average of the marks of two exams. Zero stands for a fail.

Person responsible:

Eero Hanski

Working life cooperation:

No.

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

Ei opintojaksokuvauksia.

493300A: Principles of mineral processing, 5 op

Voimassaolo: 01.08.2015 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opettajat: Saija Luukkanen
Opintokohteen kielet: English, Finnish
Leikkaavuudet:

ay493300A Principles of mineral processing (OPEN UNI) 5.0 op

ECTS Credits:

5 ECTS / 133 hours of work

Language of instruction:

Finnish; material mainly in English

Timing:

2nd period in the autumn. Recommended for the 3rd year students.

Learning outcomes:

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

Contents:

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

Mode of delivery:

Mainly face-to-face teaching

Learning activities and teaching methods:

Lectures, demonstrations, assignments

Target group:

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

Prerequisites and co-requisites:

-

Recommended optional programme components:

-

Recommended or required reading:

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

Assessment methods and criteria:

Final exam, home works and practicals, energy

Grading:

1-5/fail

Person responsible:

Saija Luukkanen

Working life cooperation:

No

Other information:

-

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:

-

477502A: Experiment design and analysis, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Process and Environmental Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Aki Sorsa

Opintokohteen kielet: Finnish

Leikkaavuudet:

470432A Process Control Engineering II 5.0 op

ECTS Credits:

5 ECTS /133 hours of work

Language of instruction:

Finnish

Timing:

Implementation in the 4th period on the spring term

Learning outcomes:

After the course, the student knows different experimental design methods and their applicability for different problems. He can also design experiments for multi-variable processes and analyze the results. He can also use some basic means to visualize the results got from experimental data and choose proper tools for experiment design problems.

Contents:

Systematic design of process experiments with matrix techniques (Hadamard, Central Composite Design, Taguchi). Graphical and statistical analysis of experimental data. Correlation, regression and variance analysis. Dynamic data based modelling.

Mode of delivery:

Lectures and extensive exercise work

Learning activities and teaching methods:

Lectures during one period

Target group:

Bachelor's students in process and environmental engineering

Prerequisites and co-requisites:

Course Process Dynamics is recommended beforehand

Recommended optional programme components:

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

Recommended or required reading:

Reading materials. *Additional literature*: Diamond W.J.: Practical Experiment Designs. Lifetime Learning Publications. Belmont, California, 1981. 348 pp.

Assessment methods and criteria:

Examination. It is recommended to take the course also according to the principle of continuous evaluation.

Grading:

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

Person responsible:

Professor Kauko Leiviskä

Working life cooperation:

No

Other information:

For exchange/international students also the course 477041S Experimental Design is recommended

Select 4 credits English courses

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), Faculty of Information Technology and Electrical Engineering (TST), and Oulu Mining School (KaTk).

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.

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 Optima 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 course Optima 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, TST and OMS)

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.
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), Faculty of Information Technology and Electrical Engineering (TST), and Oulu Mining School (KaTk).

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.

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 4 basic areas:
i) business communication (e.g. telephoning skills and correspondence),
ii) social 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, TST and OMS).

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 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), Faculty of Information Technology and Electrical Engineering (TST), and Oulu Mining School (KaTk).

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.

Learning outcomes:

By the end of the course, you are expected to be able to
1) define what you need to know about a word or a lexical phrase in order to learn vocabulary,
2) give examples of how words are built from meaningful parts,
3) apply vocabulary learning techniques,
4) explain and apply general academic / scientific vocabulary (AWL),
5) outline the characteristics of informal vs. formal / academic vocabulary,
6) demonstrate basic academic writing and communication skills.

Contents:

The general aim of this module is 1) to help you become aware of the strategies which best promote your skills to learn and memorise vocabulary, and 2) 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 (*the Academic Word List*).
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 be given 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 (6 hours); two exams (10), one around the midpoint of the course and the other towards the end; presentations (6), which will be given in class to small groups of students; and other homework assignments (5 hours). Active participation is essential.

Target group:

Students in the engineering programmes (TTK, TST and OMS)

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 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. In addition to this, satisfactory completion of the in-class/ homework assignments and the two vocabulary tests is required.
Lue lisää opintosuoritusten arvostelusta yliopiston verkkosivulta.

Grading:

Pass/Fail

Person responsible:

See contact teachers

Working life cooperation:

-

Other information:

-

902149Y: Mechanics of Writing, 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 (Average - Advanced)

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), Faculty of Information Technology and Electrical Engineering (TST), and Oulu Mining School (KaTk).

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.

Learning outcomes:

By the end of the course, you will be able to demonstrate that
1. you can organise the structure of sentences and paragraphs for clarity and impact,
2. you can use punctuation appropriately,
3. you can make appropriate stylistic choices in academic writing.

Contents:

The purpose of this course is to help you develop essential writing skills for the production of academic and professional texts in technology.
The module covers three main topics: ordering information in sentences, punctuation and sentence style. During the module, students work independently, studying online handouts and consolidating their learning by working through online exercises.

Mode of delivery:

Web-supported independent study

Learning activities and teaching methods:

This module is completed through independent study of online resources (online handouts and exercises). An online tutor is available to answer questions and give guidance whenever necessary.

Target group:

Students in the engineering programmes (TTK and TST). Especially recommended for students with M or higher for English in matriculation exam.

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 available online.

Assessment methods and criteria:

The module is assessed by a final test, which can be taken on any of three test dates (approximately a month apart) in a classroom on the Linnanmaa campus.
Read more about assessment criteria at the University of Oulu webpage.

Grading:

Pass/Fail

Person responsible:

See contact teachers

Working life cooperation:

-

Other information:

-

A439129: Studies Preparing for the Option, Mining Engineering and Mineral Processing, 55 op

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Basic and Intermediate Studies
Laji: Study module
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

Compulsory

477013P: Introduction to Process and Environmental Engineering, 5 op

Voimassaolo: 01.12.2016 -
Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Field of Process and Environmental Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Eetu-Pekka Heikkinen

Opintokohteen kielet: Finnish

ECTS Credits:

5 cr / 135 hours of work.

Language of instruction:

Finnish

Timing:

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

Learning outcomes:

Students can examine industrial processes using the methods and perspectives of process and environmental engineering (e.g. unit operations, material management, phenomenon-based considerations, automation, energy and environment) and they recognize the role of different areas of the process and environmental engineering, when these areas are considered in the forthcoming courses.

Contents:

1. Unit operations. 2. Material balances. 3. Phenomenon-based considerations. 4. Material transport. 5. Process control and automation. 6. Principles in use, planning and protection of water and land resources: primary production, municipalities and industry. 7. Energy systems. 8. Productive activity as a part of society.

Mode of delivery:

Classroom education

Learning activities and teaching methods:

Pair exercises and contact-education that supports these exercises. Only in Finnish.

Target group:

Students of process and environmental engineering

Prerequisites and co-requisites:

None

Recommended optional programme components:

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

Recommended or required reading:

Material will be distributed during lectures and via courses www-site.

Assessment methods and criteria:

Pair exercises. Please note that the course is not organised in English.

Grading:

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

Person responsible:

university lecturer Eetu-Pekka Heikkinen

Working life cooperation:

-

Other information:

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

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: Anna-Kaisa Ronkanen, 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 /135 hours of work

Language of instruction:

Finnish but also option to complete the course in English

Timing:

In the period 1

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 exercises.

Learning activities and teaching methods:

Lectures 10 h, exercises 16 h and independent work 109 h. Totally 135 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 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 assign-ments (80%) and examination (20%).

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

Working life cooperation:

-

Other information:

-

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.

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 1 and 2. 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

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.

477122A: Bulk Solids Handling, 5 op

Voimassaolo: 01.08.2015 - 31.07.2023

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Process and Environmental Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Maria Salmela-Karhu

Opintokohteen kielet: Finnish

Leikkaavuudet:

477120A	Fluid and Particle Engineering	5.0 op
477102A	Fluid and Particle Technology II	4.0 op

ECTS Credits:

5 ECTS / 133 h of work

Language of instruction:

Finnish

Timing:

Implementation in period 2 (autumn term)

Learning outcomes:

Upon completion of the course, a student should be able to identify auxiliary mechanical unit processes as well as equipments and phenomena related to them. In addition, the student can explain application of unit processes and can describe their operational principles.

Contents:

Liquid and susensions: fluid mechanics, pumping and hydraulic transport, mixing. Gases and aerodispersions: gas dynamics, compression, pneumatic transport. Granular bulk material: properties, storage, mechanical transportation, fluidization.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

The implementation methods of the course vary. Lectures and exercises max. 48 h. A part of teaching can be replaced by home or group works.

Target group:

Bachelor students in process or environmental engineering

Prerequisites and co-requisites:

477101A Particle Technology

Recommended optional programme components:

-

Recommended or required reading:

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

Assessment methods and criteria:

This course utilizes continuous assessment including lecture diaries and three intermediate exams. Alternatively, the course can also be completed by taking the end exam.

Grading:

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

Person responsible:

Maria Salmela-Karhu

Working life cooperation:

No

Other information:

-

780123P: Introductory Laboratory Works in Chemistry, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

780127P	Principles of Chemistry Labwork	5.0 op

ECTS Credits:

5 credits / 135 hours of work

Language of instruction:

Finnish

Timing:

1st autumn or 1st spring

Learning outcomes:

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

Contents:

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

Mode of delivery:

Supervised laboratory work, independently done preparatory problems.

Learning activities and teaching methods:

Safety in laboratory 2 hours, 40 hours of laboratory works, 93 hours of self-study.

Target group:

Biochemistry, Process Engineering, Environmental engineering, compulsory. In the entity of 25 credits, compulsory.
Physical Sciences, Geology, Mathematical Sciences, optional.

Prerequisites and co-requisites:

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

Recommended optional programme components:

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

Recommended or required reading:

Instruction Book (in Finnish): Kemian perustyöt 780123P.

Assessment methods and criteria:

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

Grading:

The course utilizes verbal grading scale pass/fail.

Person responsible:

Teija Kangas

Working life cooperation:

No

Other information:

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

477201A: Material and Energy Balances, 5 op

Voimassaolo: 01.08.2005 - 31.12.2019
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Field of Process and Environmental Engineering
Arvostelu: 1 - 5, pass, fail
Opettajat: Tiina Leiviskä
Opintokohteen kielet: Finnish
Leikkaavuudet:

477221A	Material and Energy Balances	5.0 op
470220A	Fundamentals of Chemical Process Engineering	5.0 op

ECTS Credits:

5 ECTS /133 hours of work

Language of instruction:

Finnish. The course can be completed in English as a book examination.

Timing:

Spring periods 3 and 4.

Learning outcomes:

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

Contents:

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

Mode of delivery:

Lectures and group exercise

Learning activities and teaching methods:

Lectures 40h, group work 10h and self-study 80h

Target group:

Bachelor students in of Process or Environmental Engineering

Prerequisites and co-requisites:

Basics from the course Introduction to Process Engineering

Recommended optional programme components:

-

Recommended or required reading:

Reklaitis, G.V.: Introduction to Material and Energy Balances. John Wiley & Sons, 1983. ISBN 0-471-04131-9.

Assessment methods and criteria:

During the course, there are two intermediate exams and both of them must be passed. Alternatively student can participate in final exam after the course. In addition to this, the students will be making a group exercise, which will be evaluated.
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:

Dr Tiina Leiviskä

Working life cooperation:

No

Other information:

-

477401A: Thermodynamic Equilibria, 5 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Process and Environmental Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Eetu-Pekka Heikkinen

Opintokohteen kielet: Finnish

Leikkaavuudet:

470611A	Metallurgy Processes	7.0 op

ECTS Credits:

5 cr / 135 hours of work.

Language of instruction:

Finnish

Timing:

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

Learning outcomes:

Student is capable of defining chemical equilibria of the systems that are related to industrial processes and understands the relevance of equilibria (and their computational determination) as a part of process analysis, planning and control. Additionally, (s)he can define a meaningful system to be considered in computation thermodynamics; i.e. (s)he can create a computationally solvable problem based on technical problem that in itself is not solvable computationally.

Contents:

Concepts of entalphy (H), entropy (S) and Gibbs free energy (G). The effect of temperature and pressure on H, S and G. Chemical and phase equilibria. Activity and activity coefficient. Calculation of thermodynamic equilibria using equilibrium constant as well as Gibbs free energy minimisation.

Mode of delivery:

Classroom education

Learning activities and teaching methods:

Lectures, software exercise as well as other exercises. Only in Finnish.

Target group:

Students of process and environmental engineering

Prerequisites and co-requisites:

'Basic Principles in Chemistry' and 'Material and Energy Balances' as prerequisities.

Recommended optional programme components:

This is one of the courses in which physical chemistry is used in the applications of process and environmental engineering. It is part of a education that aims at skills needed in the phenomenon-based modelling and planning of industrial processes.

Recommended or required reading:

Material will be distributed during lectures and exercises. It is also available via courses www-site.

Assessment methods and criteria:

Students are required to make a portfolio consisting of a learning diary and exercices. Please note that the course is organised only in Finnish.

Grading:

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

Person responsible:

university lecturer Eetu-Pekka Heikkinen

Working life cooperation:

-

Other information:

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

493302A: Chemical phenomena in mineral processes, 5 op

Voimassaolo: 01.08.2016 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opettajat: Saija Luukkanen

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS / 133 hours of work

Language of instruction:

Finnish, course material in English

Timing:

The course is held in the spring semester, during period 3. It is recommended to complete the course at the 3rd spring semester

Learning outcomes:

Upon succesfull completion student can explain physical-chemical phenomenons (especially surface and electro chemical) affecting various unit operations in mineral processing. Student can also describe general phases in mineral processing and unit operation from standpoint of physical chemistry.

Contents:

Basic equations in thermodynamics; chemical interactions especially in interfaces; electrochemical interactions.

Mode of delivery:

Face to face teaching

Learning activities and teaching methods:

32 h lectures and practicals

Target group:

Major students in Mining engineering and mineral processing, minor subject students in Geosciences and Process engineering.

Prerequisites and co-requisites:

493300A Principles of Mineral Processing

Recommended optional programme components:

-

Recommended or required reading:

Lecture and electronic material

Assessment methods and criteria:

Final exam, practicals, activity

Grading:

1-5/fail

Person responsible:

Saija Luukkanen

Working life cooperation:

No

Other information:

-

A439130: Studies Preparing for the Option, Applied Geophysics, 55 op

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Basic and Intermediate Studies
Laji: Study module
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

Compulsory

031080A: Signal Analysis, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Applied Mathematics and Computational Mathematics

Arvostelu: 1 - 5, pass, fail

Opettajat: Kotila, Vesa Iisakki

Opintokohteen kielet: Finnish

Leikkaavuudet:

031050A Signal Analysis 4.0 op

ECTS Credits:

5 ECTS credits / 135 hours of work

Language of instruction:

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

Timing:

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

Learning outcomes:

Upon completion of the course, the student:
-is able to calculate the energy, the power, the convolution and the frequency spectrum of discrete and analog, periodic and non-periodic deterministic signals
-is able to study the stationarity, the mutual dependence and the frequency content of random signals by means of the auto- and cross-correlation functions, and the power- and cross-power spectral densities
-is able to explain the mathematical grounds of the most central optimal systems used in signal estimation
-can solve related problems

Contents:

Signals, classification, frequency. Fourier analysis, analog and digital signal, fast Fourier transform. Random variable. Random signal. Stationarity, autocorrelation. Power spectral density. Poisson process, RTS-signal. Signal estimation, orthogonality principle, Yule-Walker equations, Wiener filter.

Mode of delivery:

Blended teaching.

Learning activities and teaching methods:

Lectures 28 h / Exercises 14 h / Self-study privately or in a group 93 h. The independent work includes individual STACK-assignments as online work.

Target group:

-

Prerequisites and co-requisites:

The recommended prerequisite is the completion of the courses 031078P Matrix Algebra, 031021P Probability and Mathematical Statistics and 031077P Complex Analysis.

Recommended optional programme components:

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

Recommended or required reading:

Lecture notes. Additional reading: Proakis, J.G., Manolakis, D.K.: Introduction to Digital Signal Pro-cessing. Shanmugan, K.S., Breipohl, A.M.: Random Signals, Detection, Estimation and Data Analysis.

Assessment methods and criteria:

The course is completed with a final exam or a retake exam. In addition to the final exam, STACK-assignments given during the course are part of the assessment. The assessment of the course is based on the learning outcomes of the course.
Read more about assessment criteria at the University of Oulu webpage.

Grading:

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

Person responsible:

Vesa Kotila

Working life cooperation:

-

Other information:

-

802339A: Basic course in inverse problems, 5 op

Voimassaolo: 01.06.2016 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Field of Mathematics
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

521141P: Elementary Programming, 5 op

Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Computer Science and Engineering DP
Arvostelu: 1 - 5, pass, fail
Opettajat: Mika Oja, Mika Rautiainen
Opintokohteen kielet: Finnish
Leikkaavuudet:

ay521141P Elementary Programming (OPEN UNI) 5.0 op

Voidaan suorittaa useasti: Kyllä

ECTS Credits:

5 ECTS Cr

Language of instruction:

Lectures and learning material are in Finnish. The course can be completed in English by self-studying from a book, completing assignments and exercises on the course learning environment, and delivering a final project.

Timing:

Fall, period 1. There is an option to extend the course to the 2nd period in cases where completing in one period doesn't fit the student's schedule.

Learning outcomes:

1. Is capable of solving problems in the computer's terms

2. Understands the basic concepts of programming

3. Knows the basics of the Python programming language

4. Is able to implement programs independently

5. Is able to use the internet to find information about programming

Contents:

Problem solving with programming, basic concepts of programming, writing Python code.

Mode of delivery:

Web-based teaching + face-to-face teaching

Learning activities and teaching methods:

30h of exercise groups, 105h self-studying in the web.

Target group:

1 st year students of computer science and engineering, electrical engineering, medical and wellness technology and industrial and engineering management, 2nd year students of physics, and other students of the University of Oulu

Prerequisites and co-requisites:

None.

Recommended optional programme components:

The course provides a basis for subsequent programming courses.

Recommended or required reading:

Web material in an online learning environment. Address will be announced at the beginning of the course.

Assessment methods and criteria:

The course is completed by passing all learning assignments, programming exercises and a final exercise project. Read more about assessment criteria at the University of Oulu webpage
Read more about assessment criteria at the University of Oulu webpage.

Grading:

pass/fail.

Person responsible:

Mika Oja

Working life cooperation:

-

Other information:

-

488051A: AutoCAD and Matlab in Process and Environmental Engineering, 5 op

Voimassaolo: 01.08.2015 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Field of Process and Environmental Engineering
Arvostelu: 1 - 5, pass, fail
Opettajat: Pekka Rossi, Aki Sorsa
Opintokohteen kielet: Finnish
Leikkaavuudet:

477033A	Programming in Matlab	2.5 op
477032A	AutoCAD in Process and Environmental Engineering	2.0 op

ECTS Credits:

5 ECTS /133 hours of work

Language of instruction:

Finnish

Timing:

Periods 3-4 (spring term)

Learning outcomes:

Upon completion of the course, the student will have readiness to use AutoCAD and Matlab programs in different planning and problem solving assignments of process and environmental engineering.

Contents:

Properties of the AutoCAD program, planning exercises (e.g. process flow chart, map planning, instrumentation layout). Basic use, plotting, programming structures, problem solving and finding programming errors with Matlab.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Computer class lectures (24 h), exercises (36 h). Face-to-face teaching 20 h (lectures and group work).

Target group:

Bachelor level students in the Process and Environmental Engineering program

Prerequisites and co-requisites:

-

Recommended optional programme components:

-

Recommended or required reading:

Lecture notes

Assessment methods and criteria:

Continuous evaluation of exercises. Home assignments.

Grading:

Pass/fail

Person responsible:

Post-doctoral researchers Pekka Rossi and Aki Sorsa

Working life cooperation:

No

Other information:

-

761111P: Basic mechanics, 5 op

Voimassaolo: 01.01.2015 -
Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Field of Physics
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish
Leikkaavuudet:

761118P Mechanics 1 5.0 op
761118P-02 Mechanics 1, lab. exercises 0.0 op
761118P-01 Mechanics 1, lectures and exam 0.0 op
ay761111P Basic mechanics (OPEN UNI) 5.0 op
761101P Basic Mechanics 4.0 op

Ei opintojaksokuvauksia.

761114P: Wave motion and optics, 5 op

Voimassaolo: 01.01.2015 -
Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Field of Physics
Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

761310A Wave motion and optics 5.0 op

761310A-01 Wave motion and optics, lectures and exam 0.0 op

761310A-02 Wave motion and optics, lab. exercises 0.0 op

761104P Wave Motion 3.0 op

Ei opintojaksokuvauksia.

494301A: Geophysical research methods of rock and soil, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opettajat: Moisio, Kari Juhani

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

494302A: GIS and spatial data, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opettajat: Moisio, Kari Juhani

Opintokohteen kielet: Finnish

ECTS Credits:

5 credits

Language of instruction:

Finnish

Timing:

Autumn term

Learning outcomes:

After completion the student collects 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 visualise spatial data in various different ways.

Contents:

Geoscientific observations and measurements are always tied to spatial location of the data. 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 visualisation of spatial data. Computer exercises demonstrate preparation and visualisation of geoscientific data in practice.

Mode of delivery:

Face to face

Learning activities and teaching methods:

Lectures and exercises totalling 40 h plus independent study 93 h.

Target group:

Students of Oulu Mining School, and the Faculties of Science and Technology. Obligatory to geosciences students in B.Sc. degree and Mining engineering and mineral processing/ Applied geophysics students in BSc (Tech) degree.

Prerequisites and co-requisites:

No specific prerequisites.

Recommended optional programme components:

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

Recommended or required reading:

Lecture notes and Löytönen, M., Toivonen, T. & Kankaanrinta, I., (Eds.) 2003: Globus GIS.

Assessment methods and criteria:

Examination and computer test.

Grading:

5-1/fail

Person responsible:

Kari Moisio

Working life cooperation:

No work practise.

Other information:

Course website

494303A: Hydrology in geosciences, 5 op

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opettajat: Moisio, Kari Juhani
Opintokohteen kielet: Finnish

ECTS Credits:

5 credits

Language of instruction:

Finnish (It is possible to do the course in English, although all the lectures and exercises will be given in Finnish).

Timing:

Spring term

Learning outcomes:

Upon the completion of the course, a student
- can define the concept of a water cycle, can name the elements of the cycle, can identify their physical basis and can estimate the magnitude of different components using the water balance equation
- can name and distinguish the principles of the methods used to observe evaporation, precipitation and runoff, and summarize their spatial and temporal variation in Finland
- can describe the behaviour of underground water in vadoze zone and aquifers and can define how the groundwater is formed and how it flows
- can identify different types of aquifers and can describe their relationship with structures of soil and bedrock
- owns basics of hydrogeology (groundwater geology)
- can name major geological and geophysical methods used in groundwater research and exploration

Contents:

Introduction to hydrology and hydrological processes in geosciences. Properties and behaviour of water in hydrosphere including hydrological cycle, its different components (evaporation, precipitation and runoff) and their relationship, observations and spatial and temporal variation of each hydrological component in

Finland. The second part of the course introduces properties and behaviour of water underground including geohydrological and hydrogeophysical aspects of water and hydrogeology. This part of the course concentrates on the behaviour and properties of water in soil, superficial deposits and bedrock, particularly in Finland. Themes such as groundwater flow, aquifers, groundwater quality, geological and geophysical research methods in hydrogeology will also be introduced.

Mode of delivery:

Face to face

Learning activities and teaching methods:

40 h lectures, 20 h exercises, 100 h independent study.

Target group:

Mining engineering and Mineral processing/ option Applied geophysics, geoscience students, other students of the University of Oulu.

Prerequisites and co-requisites:

Recommended: Introduction to Solid Earth Geophysics (494301A)

Recommended optional programme components:

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

Recommended or required reading:

Handouts and lecture notes. Selected parts from: Hooli, J. & Sallanko, J., (1996) Hydrologian luentomoniste; Grundvatten, Teori & Tillämpning. Knutsson, G. & Morfeldt, C-O. (1993) Svensk Byggtjänst, 304 p. Maanalaiset vedet - pohjavesigeologian perusteet; Korkka-Niemi, K. & Salonen, V-P. (1996) Täydennyskoulutuskeskus. Turun yliopisto, 181 p. Mälkki, E. (1999) Pohjavesi ja pohjaveden ympäristö. Tammi, 304 p.

Assessment methods and criteria:

Examination

Grading:

5-1/fail

Person responsible:

Kari Moisio

Working life cooperation:

No

Other information:

Course website

494304A: Seismology, 5 op

Voimassaolo: 01.08.2017 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opettajat: Elena Kozlovskaya
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

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

Voimassaolo: 01.08.2015 -
Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Strand

Opintokohteen kielet: Finnish

ECTS Credits:

5 credits

Language of instruction:

Finnish

Timing:

1st year spring

Learning outcomes:

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

Contents:

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

Mode of delivery:

Face to face

Learning activities and teaching methods:

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

Target group:

Major and minor subject students starting studies in geology.

Prerequisites and co-requisites:

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

Recommended or required reading:

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

Assessment methods and criteria:

Written examination.

Grading:

5-1/fail

Person responsible:

Eero Hanski

Working life cooperation:

No

A439124: Working Life Studies, Mining Technology and Mineral Processing, 25 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Study module

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

555225P: Basics of industrial engineering and management, 5 op

Voimassaolo: 01.01.2014 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Industrial Engineering and Management

Arvostelu: 1 - 5, pass, fail

Opettajat: Jukka Majava

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay555225P	Basics of industrial engineering and management (OPEN UNI)	5.0 op
555221P	Introduction to Production	2.0 op
555220P	Basic Course in Industrial Engineering and Management	3.0 op

ECTS Credits:

5 ECTS credits.

Language of instruction:

Finnish. English material is also used.

Timing:

Periods 1-2.

Learning outcomes:

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

- describe what industrial engineering and management (or operations management) means
- explain the core concepts of business operations and utilise these concepts in describing and analysing operations of an organisation
- explain in general terms the factors that affect economic performance of organisations
- utilise the terminology used in industrial engineering and management (operations management), describe the financial processes of companies and based on this describe the use of cost accounting in organisational decision-making
- calculate unit costs in various simplified settings, calculate various alternatives, as well as perform planning and goal oriented calculations based on given data, and draw conclusions based on the calculation results

Contents:

Operations and productivity, operations strategy, forecasting, accounting and cost accounting, investments and financial planning, sustainability, capacity management, location decisions, layout strategies, human resources management, supply chain management, subcontracting, inventory management, production planning, MRP & ERP, production scheduling, Just-in-Time & Lean operations, maintenance.

Mode of delivery:

The tuition will be implemented as blended teaching (web-based teaching and face-to-face teaching).

Learning activities and teaching methods:

Web-based lectures 20 h / exercises 18 h / self-study 96 h.

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 includes 555285A Project management, 555242A Product development, 555264P Managing well-being and quality of working life, and 555286A Process and quality management.

Recommended or required reading:

Lecture and exercise materials. Heizer, J. & Render, B. (2014) Operations management: sustainability and supply chain management, 11th ed. Pearson. In addition, recommended materials include Martinsuo, M. et al. (2016) Teollisuustalous kehittyvässä liiketoiminnassa chapters 7-9, 16 and 26.

Assessment methods and criteria:

This course utilises continuous assessment. During the course, there are nine mandatory weekly assignments. At least half of the assignments must be passed.

Grading:

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

Person responsible:

Adjunct professor Jukka Majava

Working life cooperation:

-

Other information:

Substitutes courses 555220P Basic Course in Industrial Engineering and Management 3 ECTS cr and 555221P Introduction to Production 2 ECTS cr.

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 / 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:

The grading is based on the exam (50 % of the grade) and exercises (50 % of the grade).

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.

491300A: Practical Training, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Practical training

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS, 2 months working full-time

Language of instruction:

Finnish or English

Timing:

Student usually works during a summer and gives a seminar included to the reporting of the training after the practical part in the forthcoming autumn or spring term.

Learning outcomes:

During the practical training the student gets experience of his/her working environment from the point of view of his/her studies and becomes acquainted with one possible future job. He/she 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.
The objective is to give an overview of the industrial area where the student may possibly work after graduation. Practical training nurtures theoretical study. In addition the training should give the student a general idea about the company and its technical and organizational operations, financial management and supervision. Student training positions often place students in employee-type positions so that the student becomes familiar with practical work, work safety, as well as with the social nature of the working environment. Students will land the jobs themselves.

Contents:

Suitable areas for practical training are, for example, the mining and metallurgical industry and mining projects.

Mode of delivery:

Working as an employee. Giving a seminar.

Learning activities and teaching methods:

Students should search for suitable training places themselves: E.g. mines, mining projects, benefication plants, or research institutes of the field are suitable for the training.

Target group:

Bachelor’s students in Mining Engineering and Mineral Processing

Prerequisites and co-requisites:

-

Recommended optional programme components:

-

Recommended or required reading:

-

Assessment methods and criteria:

Student has to present his/her original job certificates/references and submit a course credit application and a report to the supervisor of the training course (professor, student advisor, etc.). The certifcate must include the dates (from-to) for the training period and the duties.
The training is completed by writing a report, and presenting it orally in a seminar. A job certificate (original reference) must also be shown and an application must be submitted to the seminar supervisor (supervisor of the course).

Grading:

Verbal scale Passed/Failed

Person responsible:

Professors of Mining Engineering and Mineral Processing, and student advisor Marita Puikkonen

Working life cooperation:

Yes

Other information:

-

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
Toropainen, Outi

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.

491302A: Bachelor's thesis, 8 op

Voimassaolo: 01.08.2016 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish, English

ECTS Credits:

8 ECTS /213 hours of work

Language of instruction:

Finnish or English

Timing:

Spring term of the 3rd academic year

Learning outcomes:

Students show that they have basic knowledge of the essential methods of their research field and they are able to use the scientific literature.

Contents:

A thesis based on individual research of literature, field work or laboratory work. Before starting the thesis, students must agree upon the details of the thesis with their professor.

Mode of delivery:

Independent work and personal supervision

Learning activities and teaching methods:

Literature study or small own research project

Target group:

All students of the Bachelor level

Prerequisites and co-requisites:

Studies of at least two years

Recommended optional programme components:

-

Recommended or required reading:

Chosen separately in each case

Assessment methods and criteria:

20- to 30-page-long essay, which may contain a practical component in addition to a literature study

Grading:

Pass/fail

Person responsible:

Professors, lecturers

Working life cooperation:

May be

Other information:

-

491303A: Maturity test, 0 op

Voimassaolo: 01.08.2016 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

Tutkintorakenteisiin kuulumattomien opintokokonaisuuksien ja -jaksojen kuvaukset

493610A: Oulu Mining Summit, 1 op

Voimassaolo: 01.08.2016 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opettajat: Saija Luukkanen
Opintokohteen kielet: Finnish, English

Ei opintojaksokuvauksia.

491687S: Process modeling in mineral processing, 5 op

Voimassaolo: 01.08.2018 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: English

Ei opintojaksokuvauksia.