Opasraportti

FTech - Geosciences (2018 - 2019)

Tutkintorakenteet

Geosciences, Bachelor in Science

Tutkintorakenteen tila: archived

Lukuvuosi: 2018-19

Lukuvuoden alkamispäivämäärä: 01.08.2018

General Studies 8 cr (vähintään 8 op)

902002Y: English 1 (Reading for Academic Purposes), 2 op
902004Y: English 2 (Scientific Communication), 2 op
030005P: Information Skills, 1 op
770001Y: Orientation course for new students, 1 op
901055Y: Second Official Language (Swedish), Oral Skills (OMS), 1 op
901054Y: Second Official Language (Swedish), Written Skills (OMS), 1 op

Major Studies in Geosciences 98 cr (vähintään 98 op)

The following courses are compulsory to all geology students.

Basic Studies in Geology 30 cr

771117P: Basic course in mineralogy, 5 op
771113P: Introduction to Geology I, 5 op
771114P: Introduction to Geology II, 5 op
771116P: Introduction to Quaternary deposits of Finland and their resources, 5 op
771115P: Introduction to bedrock geology of Finland and ore geology, 5 op
491102P: Introduction to solid earth geophysics, 5 op

Geosciences compulsory studies 68 ECTS

774311A: A Basic Course in Geochemistry, 5 op
774304A: Analytical methods in geochemistry, 5 op
771309A: Bachelor of Science thesis and seminar, 8 op
773344A: Basics of glacial geology, 5 op
773346A: Environmental geology, 5 op
494302A: GIS and spatial data, 5 op
772310A: General mineralogy, 5 op
772351A: Geological mapping, 5 op
490301A: Geophysical research methods of rock and soil, 5 op
772335A: Introduction to ore mineralogy, 5 op

770390A: Maturity test, 0 op
772348A: Optical Mineralogy, 5 op
772386A: Ore Geology and Society, 5 op
773322A: Surficial geology in ore exploration, 5 op

Compulsory minor subject courses 25 cr (vähintään 25 op)

Compulsory minor subject courses 25 cr

555225P: Basics of industrial engineering and management, 5 op
488142A: Environmental legislation and EIA, 5 op
491101P: Introduction to mining, 5 op
555265P: Occupational Safety and Health Management, 5 op
493300A: Principles of mineral processing, 5 op

Other compulsory minor studies 19 cr (vähintään 19 op)

780120P: Basic Principles in Chemistry, 5 op
802158P: Mathematics for Economic Sciences, 7 op
031021P: Probability and Mathematical Statistics, 5 op
900060A: Technical Communication, 2 op

Optional Major or Minor Studies 30 op (vähintään 30 op)

You must take Optional Major studies at least 15 cr.

Recommended studies for **quaternary geology specialization line**.

773347A Techical properties of sediments I, 492300A Rock mechanics, 494303A Hydrology in geosciences, 772344A Sedimentary Petrology and 762321A Seismology and the structure on the earth.

Recommended studies for **economic geology specialization line**:

772349A Igneous petrology, 493302A Chemical pheomena in mineral processes, 772350A Metamorphic petrology, 772316A Structual geology, 477013A Introduction to Process and Environmental Engineering, 494303A Hydrology in geosciences, 772344A Sedimentary Petrology, 492300A Rock mechanics and 762321A Seismology and the structure of the earth.

H327009: Optional major studies in geology, 0 - 100 op
- *Electives*
  - 773347A: Technical properties of sediments I, 5 op
  - 772349A: Igneous petrology, 5 op
  - 772316A: Structural geology, 5 op
  - 772350A: Metamorphic petrology, 5 op
  - 493302A: Chemical phenomena in mineral processes, 5 op
  - 477013P: Introduction to Process and Environmental Engineering, 5 op
  - 494303A: Hydrology in geosciences, 5 op
  - 772344A: Sedimentary Petrology, 5 op
  - 771304A: Practical training, 4 - 5 op
  - 492300A: Rock mechanics, 5 op

Other studies

Other optional studies can include courses, supporting the degree, that are not part of the major and minor subject entities.

M.Sc., Geosciences

Tutkintorakenteen tila: published

Lukuvuosi: 2018-19

Lukuvuoden alkamispäivämäärä: 01.08.2018

Master of Science in Geosciences 120 cr (vähintään 120 op)

Select Advanced major studies 60 credits. Also select Specialization for Quaternary geology studies (30 credits) or Specialization for Economic geology studies (30 credits).

Also recommended courses of geology and mining school and optional courses up to 120 credits.

Advanced major studies, min. 60 ects.

773633S: Advanced Course of Surficial Geology in Ore Exploration, 5 op
772699S: Bedrock geology of Fennoscandia, 5 op
772640S: Excursion, 5 op
772691S: Exploration and mining - global to local perspectives, 5 op
774636S: Geochemistry of Mining Environment, 5 op
772666S: Master's thesis, 30 op
780699S: Maturity Test, 0 op
773655S: Sedimentology, 5 op

Specialization for quarternary geology studies 30 credits

773616S: Aerial photo interpretation in surficial geology, 5 op
773631S: Biostratigraphy, 5 op
494303A: Hydrology in geosciences, 5 op
772696S: Quantitative Evaluation of Minerals in Sediments and Rocks, 5 op
773300A: Quaternary Stratigraphy, 5 op
773348A: Technical properties of sediments II, 5 op

Specialization for economic geology studies 30 credits

772675S: Geophysics in economic geology, 5 op
774639S: Isotope geochemistry for economic geologists, 5 op
772695S: Magmatic ore deposits, 5 op
772697S: Microscopic study of rocks, 5 op
772632S: Regional ore geology of Fennoscandia, 5 op
772667S: Seminar in ore geology, 5 op

Other recommended courses

Optional studies

Opintojaksojen kuvaukset

Tutkintorakenteisiin kuuluvien opintokohteiden kuvaukset

902002Y: English 1 (Reading for Academic Purposes), 2 op

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Proficiency level:
B2/C1 on the Common European Framework of Reference scale.
Status:
This course is mandatory for students who choose English as their foreign language in the following B.Sc. degree programmes:
Faculty of Natural Sciences
•Biology
•Mathematical and Physical Sciences

Faculty of Technology
•Department of Chemistry
Oulu Mining School
•Geosciences degree programme

Please consult your faculty's Study Guide to establish the language requirements for your own degree program.
Required proficiency level:
English must have been the A1 or A2 language at school or equivalent English skills should have been acquired otherwise.
ECTS Credits:
2 ECTS / 54 hours of work
Language of instruction:
English
Timing:
Biology: 1st year spring term (periods 3 and 4)
Mathematical and Physical Sciences: 1st year autumn term (periods 1 and 2)
Chemistry: 1st year autumn term (periods 1 and 2)
Geosciences: 1st year spring term (periods 3 and 4)

Learning outcomes:
By the end of the course, you are expected to

- have acquired effective vocabulary-learning techniques
- be able to distinguish parts of words to infer meanings
- be able to utilise your knowledge of text structure and cohesion markers to understand academic texts
- to be able to extract information and learn content from English readings in scientific and professional contexts

Contents:
The course will focus on reading strategies; these include recognising how texts are organised, identifying key points in a text, and understanding words in context. Vocabulary work in the course will focus on: a) academic vocabulary, as used in formal scientific writing, and b) using your knowledge of the meanings of parts of words (affixes) to infer meaning.
Mode of delivery:
Contact teaching and independent study
Learning activities and teaching methods:
The English 1 course is adapted to accommodate many different fields of study, and thus the materials and implementation methods of the course vary. There will be 26 hours of guided teaching events and 28 hours of independent study, either individually or in a group. A more detailed course description and list of homework tasks will be provided by the teacher.
Target group:
Faculty of Natural Sciences: Biology, Mathematical & Physical Sciences
Faculty of Technology: Chemistry
Oulu Mining School: Geosciences
Prerequisites and co-requisites:
-
Recommended optional programme components:

Students are also required to take English 2 902004Y, or English 4 902005Y, AFTER completion of this course.
Recommended or required reading:
Course materials will be provided in electronic form or will be accessible from the university library.
Assessment methods and criteria:
Student work is monitored by continuous assessment, and students are required to participate regularly and actively in all contact teaching provided. During the course, there will be three monthly tests on material covered so far. The assessment of the course is based on the learning outcomes listed above.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Pass/Fail
Person responsible:
Karen Niskanen
Working life cooperation:
-
Other information:
N.B. Students with grades *laudatur* or *eximia* in their A1 English school-leaving examination can be exempted from this course and will be granted the credits. Please contact your own faculty for information.

902004Y: English 2 (Scientific Communication), 2 op

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Leikkaavuudet:

ay902004Y	English 2 (Scientific Communication) (OPEN UNI)	2.0 op

Proficiency level:
B2/C1 on the Common European Framework of Reference scale.
Status:
This course is mandatory for students who choose English as their foreign language in the following B.Sc. degree programmes:
Faculty of Natural Sciences:
Biology
Mathematical & Physical Sciences

Faculty of Technology:
Chemistry
Oulu Mining School:
Geoscience degree programme

Note: Information Processing Science students who began their studies in autumn 2017 or later will take English 4 instead.
Please consult your faculty's study guide to establish the language requirements of your own degree programme.
Required proficiency level:
Students taking this course must have had English as the A1 or A2 language at school or have equivalent skills. The course English 1 (902002Y) is a pre-requisite, unless exempted.
ECTS Credits:
2 ECTS credits / 54 hours work.
Language of instruction:
English
Timing:
Biology: 2nd year autumn term (periods 1 and 2)
Mathematic and Physical Sciences 1st year spring term (periods 3 and 4)

Chemistry: 2nd year spring term (periods 3 and 4)
Geosciences: 2nd year spring term (periods 3 and 4)
Learning outcomes:
By the end of the course, you are expected to have demonstrated the ability to:

- **use appropriate strategies and techniques for communicating effectively** in English in an academic context
- **prepare and present scientific subjects** to your classmates, using appropriate field-related vocabulary.

Contents:
Skills in listening, speaking, and presenting academic topics are practised in the classroom, where there is an emphasis on working in pairs and small groups. Homework is given to support the classroom learning.
Mode of delivery:
Contact teaching
Learning activities and teaching methods:
The English 2 course is tailored to the needs of students in different fields of study, and thus the materials and implementation methods of the course vary between groups. The teacher will provide a more detailed schedule and list of homework tasks. There will be 26 hours of guided teaching events and 28 hours of independent work, including both individual and group work.
Individual learning methods: autonomous learning tasks, practice in lecture listening and written tasks in preparation for classroom lessons
Group work: Preparation of presentations in groups

Target group:
2nd year students of Biology, Chemistry, Geoscience
1st year students of Mathematical and Physical Sciences (new programme)

Prerequisites and co-requisites:
Pre-requisite course: 902002Y Englannin kieli 1
Recommended optional programme components:
-
Recommended or required reading:
-
Assessment methods and criteria:
Continuous assessment is based on regular attendance, active participation in all lessons and the successful completion of all homework tasks.
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:
Pass / fail.
Person responsible:
Karen Niskanen
Working life cooperation:
-
Other information:
-

030005P: Information Skills, 1 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Technology

Arvostelu: 1 - 5, pass, fail

Opettajat: Ursula Heinikoski

Opintokohteen kielet: Finnish

Leikkaavuudet:

030004P	Introduction to Information Retrieval	0.0 op

ECTS Credits:
1 ECTS credits / 27 hours of work
Language of instruction:
Finnish
Timing:
Architecture 3. spring semester, period I; Biochemistry 3. autumn semester; Biology 3. autumn semester, period I; Chemistry 3. autumn semester, period II; Computer Science and Engineering 2. spring semester, period IV; Electronics and Communications Engineering 3. spring semester; Geosciences 2. spring semester, period IV; Geography 1. and 3. spring semester, period III; Industrial Engineering and

Management 3. year (Master's degree students in Industrial Engineering and Management 1st year.); Information Processing Sciences 1. year; Mathematics and Physics 1. spring semester, period III; Mechanical Engineering 3. year; Mining Engineering and Mineral Processing 3. year; Process and Environmental Engineering 2. year, period II.

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

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

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

Learning activities and teaching methods:
Training sessions 8 h, group working 7 h, self-study 12 h

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

Prerequisites and co-requisites:
-

Recommended optional programme components:
-

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

Assessment methods and criteria:
Passing the course requires participation in the training sessions and successful completion of the course assignments.

Grading:
pass/fail

Person responsible:
Ursula Heinikoski

Working life cooperation:
-

Other information:
-

770001Y: Orientation course for new students, 1 op

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
1 ECTS credit

Language of instruction:
Finnish/English

Timing:
1st year autumn

Learning outcomes:
Students are familiar with the university environment and practical issues of their studies and are able find appropriate of advice if needed.

Contents:
Students are tutored to the study system of the university and given information on the contents and goals of the Degree Programme of Geosciences.

Mode of delivery:
Face to face tutoring
Learning activities and teaching methods:
15 to 18 h of tutoring
Target group:
All 1st year geosciences students
Assessment methods and criteria:
Participation in team tutoring, creating a Personal Study Plan (PSP) for the (Bachelor's) Degree studies.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Pass/fail
Person responsible:
Dr Ninna Immonen
Working life cooperation:
No

901055Y: Second Official Language (Swedish), Oral Skills (OMS), 1 op

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

901054Y: Second Official Language (Swedish), Written Skills (OMS), 1 op

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

771117P: Basic course in mineralogy, 5 op

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

ECTS Credits:
5 ects
Person responsible:
Pekka Tuisku

771113P: Introduction to Geology I, 5 op

Voimassaolo: 01.08.2015 -
Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Strand

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay771113P Introduction to Geology I (OPEN UNI) 5.0 op

ECTS Credits:
5 credits
Language of instruction:
Finnish
Timing:
1st year autumn
Learning outcomes:
Stdents have an understanding of the basic concepts of the Earth, from its composition and internal *structure* to the geological *processes* that has led to its evolution the present Earth as part of the solar system. They can tell how endogenic processes in the mantle and crust produce magmas and how magmas produce different igneous rock type upon emplacement below and on the Earth's surface. Students are able to recognise and classify common igneous rocks based on their mineral composition and are familiar with common metamorphic rocks and know the metamorphic facies concepts. They can relate deformation and metamorphism of the rocks to plate tectonic processes.

Contents:
Evolution of the Earth as part of the solar system, structure and composition of the Earth. Classification of igneous rocks, magmatism, origin and crystallisation of magmas, volcanism, metamorphism and formation of metamorphic rocks, plate tectonics and deformation structures.
Mode of delivery:
Face to face
Learning activities and teaching methods:
36 h lectures, 6 h exercises
Target group:
1st year geoscience students. The course is a good minor subject course for others.
Prerequisites and co-requisites:
Basic course in mineralogy (771102P) is parallel to this course.
Recommended optional programme components:
This course is intended as an introduction to the scope and methods of igneous and metamorphic petrology.
Recommended or required reading:
Martti Lehtinen, Pekka Nurminen and Tapani Rämö (1998) Suomen kallioperä – 3000 vuosimiljoonaa. Suomen Geologinen Seura, Gummerus Jyväskylä, ISBN 952-90-9260-1, Chapters 2-3. John Grotzinger & Thomas H. Jordan (2010 or 2014) Understanding Earth, 6 th or 7 th edition, Chapters 1-4, 6-7, 9-10, 12.
Assessment methods and criteria:
Written examination and identification test of rock types.
Grading:
5-1/fail
Person responsible:
Kari Strand
Working life cooperation:
No

771114P: Introduction to Geology II, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opettajat: Juha Pekka Lunkka

Opintokohteen kielet: Finnish

ECTS Credits:
5 ECTS / 133 hours of work

Language of instruction:
Finnish
Timing:
1st year autumn
Learning outcomes:
Upon completion of the course, students should have acquired basic knowledge on the concepts and processes of surficial geology. Students should also be able to identify basic sediment types and soils.
Contents:
Basic concepts of surficial physical geology, weathering, erosion, sedimentation, and sediment types, soils and geological processes forming sedimentary deposits.
Mode of delivery:
Face to face teaching
Learning activities and teaching methods:
16 h lectures, 8 h exercises
Target group:
1st year Geoscience students. The course is a good minor subject course for others.
Prerequisites and co-requisites:
No
Recommended or required reading:
Handouts and John Grotzinger & Thomas H. Jordan (2010 or 2014) Understanding Earth, 6th or 7th edition, Chapters 5, 8, 15-21.
The availability of the literature can be checked from this link.
Assessment methods and criteria:
Obligatory exercises and written examination
Grading:
5-1/fail
Person responsible:
Juha Pekka Lunkka and Tiina Eskola
Working life cooperation:
No

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

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 ECTS / 133 hours of work
Language of instruction:
Finnish
Timing:
1st year spring
Learning outcomes:
Students can describe the main features and raw material resources of the Finnish Quaternary deposits.
Contents:
Main features and raw material resources of the Finnish Quaternary deposits and their origin.

Mode of delivery:
Face to face teaching
Learning activities and teaching methods:
22 h lectures. In addition, a one-day field trip is organized in May for major subject students.

Target group:
1st year Geoscience students. The course is a good minor subject course for others.
Prerequisites and co-requisites:
Introduction to Geology II (771114P) or equivalent knowledge

Recommended or required reading:
Veli-Pekka Salonen, Matti Eronen, Matti Saarnisto (2002) Käytännön maaperägeologia, 236 s.
The availability of the literature can be checked from this link.
Assessment methods and criteria:
Written examination

Grading:
5-1/fail
Person responsible:
Juha Pekka Lunkka
Working life cooperation:
No

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

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Strand

Opintokohteen kielet: Finnish

ECTS Credits:
5 credits
Language of instruction:
Finnish
Timing:
1st year spring
Learning outcomes:
Students can describe and recognise the main geological 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

491102P: Introduction to solid earth geophysics, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opettajat: Moisio, Kari Juhani

Opintokohteen kielet: Finnish

Timing:
Spring semester, period 3. Recommended at 1st or 2nd year of the Bachelor studies.
Learning outcomes:
Upon the completion of the course, a student can describe the position and role of geophysics in the field of the Earth system sciences, can describe the structure of the Earth and its neighbouring environment in space (spheres), their internalgeophysical properties and the interactions between different spheres, can describe large scale transfer (movement) of rock material inside the Earth and on its surface (convention, plate tections) and can name most common geophysical research methods.
Contents:
An overview of geophysics. Solid Earth geo-physics and Earth Sciences. Properties, structure and dynamics of the Earth. Earth as a planet: shape, size, rotation, revolution. Earth´s gravitational field. Isostasy. Deformation and rheology. Seismology: seismic waves and the internal structure of the Earth. Earth´s geomagnetic field. Geothermics. Electric and electromagnetic methods.
Learning activities and teaching methods:
A specific target group is written in this field.
Prerequisites and co-requisites:
No specific prerequisites.
Recommended or required reading:
Lecture materials. U. Borén, E. Hjelt, S.-E., Karjalainen, T. ja Sirviö, J., 20014. Geofysiikka, Tunne maapallosi. WSOY, 191 p. Additional recommended reading: Musset, A.E. and Aftab Khan, M., 2000: Looking into the Earth: an introduction to geological geophysics. Cambridge University Press, 470 pp. ja Lowrie, W., 1997. Fundamentals of geophysics. Cambridge University press, 354 p.
Assessment methods and criteria:
Variable grading and evaluation methods
Grading:
1-5/fall
Person responsible:
Kari Moisio
Working life cooperation:
No working life cooperation

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.

774304A: Analytical methods in geochemistry, 5 op

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 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:
know which kind of sample pre-treatment and analysis methods are used for geological samples
is aware of different factors that need to be taken into account when planning a geochemical research project.
Contents:
Detection limits and errors in analysis, presentation of analytical results, sampling, sample pre-treatment, sample digestion (melts, solutions), silicate analysis theories and practice of different instrumental methods (AAS, XRF, ICP-AES, ICP-MS, TIMS), a visit to a chemical laboratory.
Mode of delivery:
Face to face teaching.
Learning activities and teaching methods:

24 h lectures, visit to a facility for sample pre-treatment and a chemical laboratory.
Target group:
Students in geosciences and mineral processing and mining technology.
Prerequisites and co-requisites:
The recommended prerequisite is the completion of 774311A Basic Course in Geochemistry prior to enrolling for the course.
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 (Ed.) (1997) Modern Analytical Geochemistry: An Introduction to Quantitative Chemical Analysis for Earth, Environmental and Materials Scientists, Harlow, Longman, 329 p. & Sawyer, Clair N., McCarty, Perry L., Parkin, Gene F. (2003) Chemistry for Environmental Engineering and Science, Boston, McGraw-Hill, p. 410-451.
You can check the availability of the course books via this link.
Assessment methods and criteria:
Written examination.
Grading:
The course utilizes a numerical grading scale 1-5. Zero stands for a fail.
Person responsible:
Eero Hanski.
Working life cooperation:
No.

771309A: Bachelor of Science thesis and seminar, 8 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

773344A: Basics of glacial geology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opettajat: Juha Pekka Lunkka

Opintokohteen kielet: Finnish

ECTS Credits:
5 ECTS / 133 hours of work
Language of instruction:
Finnish
Timing:
2nd or 3rd study year (I period)
Learning outcomes:
Upon completion of the course, students should have acquired basic knowledge of glaciogenic sediment types and of morphological landforms and can present theories of how glaciers are formed.
Contents:
A review to history of glacial research and its methods; theories of how glaciers are generated and factors that affect them; present-day glaciers and their research; how snow turns into ice; movement of ice; structures of glaciers; glacier types; facts and theories about the geological activities in glaciers and how glacial sediments, landforms and erosional features are formed; glaciofluvial, glaciolacustrine and glaciomarine sedimentation, glacial deposits in pre-pleistocene formations, causes of ice ages.

Mode of delivery:

Face to face teaching
Learning activities and teaching methods:
26 h lectures.
Target group:
2nd and 3rd year geoscience students

Prerequisites and co-requisites:
Introduction to Geology II (771114P) or equivalent knowledge, Introduction to Quaternary deposits of Finland and their resources (771116P)

Recommended or required reading:
Bennet, M.R. & Glasser, N.F. (1996) Glacial Geology, Ice sheet and Landforms. Wiley. 364 p.
The availability of the literature can be checked from this link.

Assessment methods and criteria:
Written examination

Grading:
5-1/fail
Person responsible:
Juha Pekka Lunkka
Working life cooperation:
No

773346A: Environmental geology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opettajat: Juha Pekka Lunkka

Opintokohteen kielet: Finnish

ECTS Credits:
5 credits
Language of instruction:
Finnish.
Timing:
2nd or 3rd year.
Learning outcomes:
Upon completion of the course, the student knows and understand:
main environmental concepts
environmental effects of the use of geological resources
geological risk factors
environmental effects of human and urban activity
acidification of soil and water
Contents:
After the course students knows and can describe environment geological concepts and can use them in estimation of the effect of natural geological processes and anthropogenic activities for the environment and nature.
Mode of delivery:
Face to face teaching.
Learning activities and teaching methods:
24 hours of guided teaching, teaching without guidance either privately or in groups and visits.
Target group:
Students in the 2nd or 3rd year.
Prerequisites and co-requisites:
The prerequisite is the completion of the following courses prior to enrolling for the course: Geologian peruskurssi II (771114P) and Johdatus Suomen maaperägeologiaan ja maaperän raaka-ainevaroihin (771116P) or similiar knowledge.

Recommended or required reading:
Niini, H., Uusinoka, R. & Niinimäki, R. 2007. Geologia ympäristötoiminnassa. Rakennusgeologinen yhdistys - Byggnadsgeologiska föreningen r.y., 354 p. and Murck, B.W., Skinner, B.J. & Porter, S.C., 1996: Environmental Geology, John Wiley & Sons, 535 p., Other materials delivered during the course.
The availability of the literature can be checked from this link.
Assessment methods and criteria:
Participation in the lectures, activity in private or group works and final examination. The assessment of the course is based on the learning outcomes of the course. The more detailed assessment criteria are available on the Noppa Study Portal. Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5/fail.
Person responsible:
Pertti Sarala
Working life cooperation:
Working life cooperation The course could include visits to the companies or guest lectures of the course's subject.

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

772310A: General mineralogy, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opettajat: Pekka Tuisku

Opintokohteen kielet: Finnish

ECTS Credits:
5 credits
Language of instruction:
Finnish
Timing:
2nd or 3rd study year
Learning outcomes:
The student will deepen their basic knowledge of mineralogy.
Contents:
Research history and research methods of mineralogy. Classification of minerals, crystal chemical structures, chemical compositions, the most important properties and occurrence of minerals in rocks.
Mode of delivery:
Face to face
Learning activities and teaching methods:
26 h lectures
Target group:
2 nd and 3 rd year geosciences students.
Prerequisites and co-requisites:
Basic course in Mineralogy 771106P.
Recommended or required reading:
Wenk & Bulakh, Minerals: their Constitution and Origin, Cambridge University Press.
The availability of the literature can be checked from this link.
Assessment methods and criteria:
Written examination
Read more about assessment criteria at the University of Oulu webpage.
Grading:
5-1/fail
Person responsible:
Pekka Tuisku, Jukka Pekka Ranta, Tiina Eskola
Working life cooperation:
No

772351A: Geological mapping, 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 ETCS cr
Language of instruction:
Finnish or English

Timing:
2nd or 3th year (autumn)
Learning outcomes:
Upon completion of the course, the student knows the principles of bedrock and Quaternary mapping.
Contents:
Basic methods of geological mapping and introduction to map production.
Mode of delivery:
Face to face teaching in classroom and at field. Practical work.
Learning activities and teaching methods:
30 hours of lectures and field work.
Target group:
All students in geosciences
Prerequisites and co-requisites:
Basic studies in geosciences
Recommended or required reading:
Virkkala, K. 1972, Maaperäkartoituksen maasto-opas, Geological Survey of Finland, Espoo, Finland.
Haavisto-Hyvärinen, M. & Kutvonen, H. 2007, Maaperäkartan käyttöopas, Geological Survey of Finland, Espoo, Finland.
Laitakari, I & Matisto, A. 1974 Kallioperäkartoitus, Geological Survey of Finland, Espoo, Finland.
Assessment methods and criteria:
Participation to the lectures and field work. Construction of a bedrock and Quaternary map and a graphic log of a sediment succession.
Grading:
Pass/Fail
Person responsible:
Person responsible: Kari Strand
Teachers: Kari Strand, Juha Pekka Lunkka, Kirsi Luolavirta, Tiina Eskola
Working life cooperation:
No

490301A: Geophysical research methods of rock and soil, 5 op

Voimassaolo: 01.08.2017 - 31.07.2020

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opettajat: Moisio, Kari Juhani

Opintokohteen kielet: Finnish

ECTS Credits:
5 cr
Language of instruction:
Finnish
Timing:
2nd spring
Learning outcomes:
After the course, the student can explain the use of geophysical methods in investigating bedrock and soil structure. The student can describe theoretical basics and the measuring techniques of the different geophysical methods and has an understanding how to apply these methods in various important economical and civil targets.
Contents:
The aim of the course is to learn the principles of applying different geophysical methods for various economical and civil targets. Geophysical subjects in sediments and bedrock and basics for their exploration. Basics of petrophysical properties. Gravity methods, magnetic methods, resistivity methods, IP method, electromagnetic methods, radiometric methods and seismic methods: the physical principles, devices and measuring in practice. Aerogeophysical methods. Borehole measurements.
Mode of delivery:
Face to face
Learning activities and teaching methods:
Lectures and exercises 50 h, plus independent study.
Target group:
Students of Oulu Mining School, and the Faculties of Science and Technology.

Prerequisites and co-requisites:
No particular pre-requisites
Recommended optional programme components:
No alternative course units or course units that should be completed simultaneously.
Recommended or required reading:
: Material given during lectures, Peltoniemi, M. (1988) Maa- ja kallioperän geofysikaaliset tutkimusmenetelmät and Reynolds, J.M. (2011) Principles of Applied Geophysics. Applicable parts of the following textbooks: Milsom, J. (1989) Field Geophysics; Telford, W.M., Geldart, T.M. & Sheriff, R.E. (1990) Applied Geophysics; Kearey, P., Brooks, M. & Hill, I. (2002) An Introduction to Geophysical Exploration; Parasnis, D.S. (1997) Principles of Applied Geophysics; Sharma, P.V.,(1997) Environmental and Engineering Geophysics.
Assessment methods and criteria:
Varying assessment and evaluation methods.
Grading:
5-1/fail
Person responsible:
Kari Moisio
Working life cooperation:
No work practise

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:
Shenghong Yang
Working life cooperation:
No.

770390A: Maturity test, 0 op

Voimassaolo: 01.08.2008 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
0 credits
Language of instruction:
Finnish or Swedish (for international students English)
Timing:
3rd spring
Learning outcomes:
The student can independently produce scientific text using his/her mother tongue or English. The maturity test shows familiarity with the subjects of the Bachelor's thesis.
Contents:
Written test on the subject of the B.Sc. thesis.
Mode of delivery:
Independent preparation for the test.
Learning activities and teaching methods:
Independent work
Target group:
Compulsory in the B.Sc. degree to all geoscience students.
Prerequisites and co-requisites:
Written after the completion of the Bachelor's thesis (for international Master's students, after completion of the Master's thesis if not done at the Bachelor level).
Recommended optional programme components:
No alternative course units.
Recommended or required reading:
No reading
Assessment methods and criteria:
The test event. The length of the text is recommended to be one exam paper (four pages).
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Pass/fail
Person responsible:
Supervisor of the Master's thesis.
Working life cooperation:
No work practise.

772348A: Optical Mineralogy, 5 op

Voimassaolo: 01.08.2017 -

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

Person responsible:
Pekka Tuisku

772386A: Ore Geology and Society, 5 op

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

ECTS Credits:
5 ECTS
Language of instruction:
english/finnish
Timing:
2nd or 3rd year
Learning outcomes:
Upon completion of the course, students should have a basic knowledge of the raw materials obtained by mining and their role in the modern society. Based on geological review of ore deposit types the dynamics of various commodity spaces will be examined with an emphasis on the dynamics of demand and supply fundamentals. Also, challenges to the mining industry with regard to social acceptance will be discussed

Contents:
The ore-forming processes, classification schemes for ore deposit, global distribution of mineral resources, discussion of economic, social and other constraints on exploration and mining.

Mode of delivery:
Face to face
Learning activities and teaching methods:
Lectures and hand specimen examination
Recommended or required reading:
Kesler, S., Simon, A. (2015) Mineral Resources, Economics and the Environment, Cambridge University Press, Second edition, 434 p.
Robb, L. (2005). Introduction to ore-forming processes. Blackwell Publishing, 373 p.

Assessment methods and criteria:
Written examination
Grading:
1-5/fail
Person responsible:
Jukka-Pekka Ranta
Working life cooperation:
No

773322A: Surficial geology in ore exploration, 5 op

Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 credits.
Language of instruction:
Finnish or English.
Timing:
2nd (periods 3 or 4) or 3rd year.
Learning outcomes:
Upon completion of the course, the student knows and understand:
main stages of surficial geological ore exploration process including basic knowledge of the use of glacial morphologies, ore boulders and till geochemistry in mineral exploration in the glaciated terrains
elements' concentrations and the effect of their variability in different sediments
sampling, sample processing and analytical methods
Contents:
Student learn main stages of surficial geological ore exploration process and the methods used.
In addition, main concepts of boulder hunting and geochemical dispersion in the glaciated terrains are studied.
Mode of delivery:
Face to face teaching.
Learning activities and teaching methods:
There will be 24 hours of guided teaching and teaching without guidance either privately or in groups.
Target group:
Stdents in the 2nd or 3rd year.
Prerequisites and co-requisites:
The prerequisite is the completion of the following courses prior to enrolling for the course: Geologian peruskurssi II (771114P), Johdatus Suomen maaperägeologiaan ja maaperän raaka-ainevaroihin (771116P) and Glasiaaligeologian perusteet (773344A) or similiar knowledge.
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:
Kujansuu, R. ja Saarnisto, M. (eds.): Glacial Indicator Tracing, A.A. Balkema, 1990, 252 s. ja Sarala, P. 2015. Surficial geochemical exploration methods. In: Mayer, W.D., Lahtinen, R. & O'Brien, H. (toim.), Mineral deposits of Finland. Chapter 10.1. Elsevier, Amsterdam. s. 711-731. Other materials delivered during the course.
The availability of the literature can be checked from this link.
Assessment methods and criteria:
Participation in the lectures, activity in private or group works, final examination. The assessment of the course is based on the learning outcomes of the course. The more detailed assessment criteria are available on the Noppa Study Portal. Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5/fail.
Person responsible:
Pertti Sarala
Working life cooperation:
The course could include visits to the companies or quest lectures of the course's subject.

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.

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

ECTS Credits:
5 ECTS credits/133 hours of work
Language of instruction:
Finnish
Timing:
The course is held in the spring semester during the period 3
Learning outcomes:
Upon completion of the course, the student know environmental legislation system in Finland and hierarcy of environmental authorities. She/He also will be able to explain differences between environmental permission and environmental impact assessment (EIA) and know the steps in the EIA process. She/He also know what kind of projects need to go trough EIA. Spesific areas in the course are mining, energy and water issues.

Contents:
Finnish law, EU directives.
Mode of delivery:
Face-to-face teaching and independent work with selected projects.

Learning activities and teaching methods:
Lectures 18 h /seminars 8 h / independent work with project topic 107 h. Totally 133 h. The project work are completed as a group work.
Target group:
Students in the bachelor programs of process and environmental engineering, mining school

Recommended or required reading:
Ympäristöoikeuden pääpiirteet (Ekroos, Kumpula 2010, ISBN: 9789510361283)

Assessment methods and criteria:
The student participate in the organized seminars by presenting the project work, being as a opponent to other group and peer reviewing other's presentation. Attendance to the seminar is combulsory and absence must be compensate. Also two learing diaries are required from the lectures. The final grade of the course is weighted average of project report (40%), seminar presentation (30%), seminar activities (10%) and learning diaries (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:
The main of the course lectures are given by Suomen juristit Oy. The selected project topic is relating to true environmental projects that brings learning outcomes from the course.

Other information:
Only students from target gourp can be accepted to the course

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

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.

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:
-

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

802158P: Mathematics for Economic Sciences, 7 op

Voimassaolo: 01.06.2014 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Myllylä

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay802158P	Mathematics for Economic Sciences (OPEN UNI)	7.0 op

ECTS Credits:
7 ECTS cr
Language of instruction:
Finnish
Timing:
1. period. It is recommended to complete the course at the 1st autumn semester.
Learning outcomes:
After completing the course, student is able to
- define and apply basic mathematical concept such as rationals, absolute value, power and root function
- handle different types of functions and knows their special properties
- solve different equations and inequalities
- define the concepts of limit and continuity of a function
- calculate limits in case of different functions

- calculate and apply derivative, and knows the relevance of the concept
- use all mathematical concepts covered by the course in different problems related to economics (interest, investments, optimization and indeces)

Contents:
Course aims to build a solid background to mathematics in later economics courses. Course begins with a revision of concepts familiar from high school such as sequences, rationals, absolute value and powers. After that we focus on different types of functions such as polynomials, rational fuctions, exponential functions and logarithm.
Different types of equations and inequalities, containing the functions mentioned above, are solved. Main concepts in the course are also limit of a function, continuity and derivative and their applications. Nämä käsitteet tullaan esittelemään kaikille kurssilla käsiteltäville
funktiotyypeille.
After the more mathematical part, the focus is turned on economical applications (such as interests, optimization, investments, indeces).

Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
Lectures 40 h, exercises 20 h.

Target group:
Students in Oulu Business School

Prerequisites and co-requisites:
None

Recommended optional programme components:
After the course, student is able to continue other mathematics courses directed to the students in Oulu Business School.

Recommended or required reading:
Lecture notes

Assessment methods and criteria:
Mid-term exams and/or final exam

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

Person responsible:
Kari Myllylä / Erkki Laitinen

Working life cooperation:
-

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:
-

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.

H327009: Optional major studies in geology, 0 - 100 op

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

Ei opintojaksokuvauksia.

Electives

773347A: Technical properties of sediments I, 5 op

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

ECTS Credits:
5 ect
Language of instruction:

Finnish

Timing:

2. or 3. level

Grading:

5-1/fail

Person responsible:

Tiina Eskola

Working life cooperation:

No working life cooperation

772349A: Igneous petrology, 5 op

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

Person responsible:

Pekka Tuisku

772316A: Structural geology, 5 op

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

ECTS Credits:

5 credits

Language of instruction:

Finnish or English

Timing:

2nd or 3rd year, autumn semester

Learning outcomes:

The student is able to analyze and describe deformation structures of the bedrock, and based on the result, he/she can evaluate the mechanisms of deformation and characteristics of the deformation processes.

Contents:

Development of structural geology and principles of the stress and strain theory, microscopic structural elements, fractures and fault structures, folding and fold structures, multiphase deformation and interference structures.

Mode of delivery:

Face to face

Learning activities and teaching methods:

24 h lectures, 85 h independent study.

Target group:

2nd and 3rd year geoscience students.

Prerequisites and co-requisites:

Basic studies in Geosciences.

Recommended optional programme components:

-

Recommended or required reading:

Material given during lectures and Haakon Fossen (2010) Structural Geology, Cambridge University Press, 480 p.
The availability of the literature can be checked from this link.

Assessment methods and criteria:

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

Grading:

5-1/fail

Person responsible:

N.N.

Working life cooperation:

No

772350A: Metamorphic petrology, 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

Person responsible:

Pekka Tuisku

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:

-

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 more detail 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. The amount of classroom education is 16-32 hours the rest being studying independently. Only in Finnish.

Target group:

Students of process and environmental engineering

Prerequisites and co-requisites:

No prerequisities.

Recommended optional programme components:

This course is an introduction to the other courses of process and environmental engineering. Additionally, this course has connections to the course of Technical communication (900060A). It is recommended to complete these courses simultaneously if possible.

Recommended or required reading:

Material will be distributed during lectures and via courses www-site. Students are required to acquire additional material for the exercises.

Assessment methods and criteria:

This course utilizes continuous assessment. During the course, there are eight exercises that are made as pair-work. 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:

There is no direct working life cooperation in this course.

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.

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 behavior 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. Properties and behaviour of underground water including geohydrological and hydrogeophysical aspects of water and hydrogeology. Behaviour and properties of water in soil, superficial deposits and bedrock, particularly in Finland. Groundwater flow, aquifers, groundwater quality, geological and geophysical research methods in hydrogeology

Mode of delivery:

Face to face

Learning activities and teaching methods:

50 h lectures and exercises

Target group:

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

Prerequisites and co-requisites:

Recommended: I494301A Geophysical research methods of rock and soil

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:
Applied Hydrogeology. C.W. Fetter (2001 fourth edition)
Physical and Chemical Hydrogeology. P.A Domenico & F.W. Schwartz, 1997 second edition.
Maanalaiset vedet - pohjavesigeologian perusteet; Korkka-Niemi, K. & Salonen, V-P. Täydennyskoulutuskeskus. Turun yliopisto. 1996. 181 s
Pohjavesi ja pohjaveden ympäristö. Mälkki, E. Tammi. 1999 304 s.

Assessment methods and criteria:

Varying assessment and evaluation methods.

Grading:

1-5/fail

Person responsible:

Kari Moisio

Working life cooperation:

No work practice

772344A: Sedimentary Petrology, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opettajat: Pekka Tuisku

Opintokohteen kielet: Finnish

ECTS Credits:

5 credits

Language of instruction:

Finnish

Timing:

2nd or 3rd study year

Learning outcomes:

During the course students will get familiar with the basic concepts of sedimentary rocks and develop a general understanding on their classification and processes of formation. They will know about the major sedimentary structures, major depositional environments and their facies and stratigraphic characteristics and be able to interpret potential sources and transportation mechanisms of sediments based on their macroscopic and microscopic characteristics.

Contents:

Characteristics and classification of sedimentary rocks, their mode of occurrence and processes of formation. Identification of sedimentary rocks and their minerals using microscope.

Mode of delivery:

Face to face

Learning activities and teaching methods:

20 h lectures, 20 h microscope exercises.

Target group:

2nd or 3rd year geoscience students.

Prerequisites and co-requisites:

Optical mineralogy (772339A), Introduction to Geology II (771114P).

Recommended optional programme components:

-

Recommended or required reading:

Blatt and Tracy (2006) Petrology: Igneous, sedimentary and metamorphic, Freeman, 3rd edition.
The availability of the literature can be checked from this link.

Assessment methods and criteria:

Learning diary and written report or alternatively written examination.
Read more about assessment criteria at the University of Oulu webpage.

Grading:

5-1/fail

Person responsible:

Pekka Tuisku

Working life cooperation:

No

771304A: Practical training, 4 - 5 op

Opiskelumuoto: Intermediate Studies

Laji: Practical training

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

4-5 credits

Language of instruction:

Finnish/English

Timing:

Commonly done as summer work during Bachelor's studies.

Learning outcomes:

Students will get familiar with geologists' duties in real-world situations and can assess the development of their own expertise during the training.

Contents:

Practical training accomplished under the guidance of a qualified geologist in Finland or abroad. Before the training, students must in advance agree upon the details of the field work with their professor, such as the work place, time, instructor and the supervisor.

Mode of delivery:

Participation in work life.

Learning activities and teaching methods:

A period of 1.5 to 3 month of practical work in a company or research institute, written report. For work exceeding 1.5 months 4 ECTS credits are granted and for the extending 2 months, 5 ECTS credits are granted.

Target group:

Obligatory to all geosciences students pursuing a Bachelor's degree.

Assessment methods and criteria:

A written report on the training work.
Read more about assessment criteria at the University of Oulu webpage.

Grading:

Pass/fail

Person responsible:

Eero Hanski, Juha Pekka Lunkka

Working life cooperation:

Yes

Other information:

One practical work course belongs to the Bachelor's degree.

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:

-

773633S: Advanced Course of Surficial Geology in Ore Exploration, 5 op

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

ECTS Credits:

5 ECTS.
Language of instruction:
English or Finnish.
Timing:
4th or 5th year.
Learning outcomes:
Upon completion of the course, the student knows and understand:
Mode of the element occurrence in surficial sediments
Research methods of the element occurrences
Analytical techniques: chemical and mineralogical
Mineral fractions and different concentration techniques
Heavy minerals and indicator minerals in ore exploration
Advanced surficial geochemical and biogeochemical sampling and analysis methods
Contents:
To describe and explain broadly and analytically the modes of element occurrence in surficial sediments (mainly in glaciated terrain), their analysis methods and the use of indicator minerals and advanced surficial geochemical techniques in ore exploration with an emphasis of conventional and modern approach.
Mode of delivery:
Face to face teaching.
Learning activities and teaching methods:
The implementation methods of the course vary and will be agreed on together with the students for each course. There will be 24 hours of guided teaching and visits, and about 20 hours of teaching without guidance either privately or in groups.
Target group:
Students in the 4th or 5th (periods 1 or 2) year, international students.
Prerequisites and co-requisites:
The prerequisite is the completion of the following courses prior to enrolling for the course: Geologian peruskurssi II (771114P), Johdatus Suomen maaperägeologiaan ja maaperän raaka-ainevaroihin (771116P) and Maaperägeologinen malminetsintä (773322A) or similar knowledge.
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:
McClenaghan, M., Bobrowsky, P.T., Hall, G.E.M. & Cook, S.J., (2001) Drift Exploration in Glaciated Terrain, Geological Society Special Publication N:o 185, 350 p., Other materials delivered during the course.
The availability of the textbooks can be checked via this link.

Assessment methods and criteria:
Participation in the lectures, activity in private or group works, final examination. The assessment of the course is based on the learning outcomes of the course. The more detailed assessment criteria are available on the Noppa Study Portal. Read more about assessment criteria at the University of Oulu webpage.
Grading:
Grading 1-5/fail.
Person responsible:
Pertti Sarala
Working life cooperation:
The course could include visits to the companies or guest lectures of the course's subject.

772699S: Bedrock geology of Fennoscandia, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Advanced 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 or English, depending on the participants.
Timing:
The course is held in the autumn semester, during period II. It is recommended to complete the course at the 4th or 5th autumn semester.
Learning outcomes:
Upon completion of this course, the student will:
have a good overview of the Finnish Precambrian bedrock and its evolution through time.
Contents:
The main geological units of the Finnish bedrock as part of the evolution of the Fennoscandian Shield. Magmatism, sedimentology and metamorphism and geochronology of the Finnish bedrock.
Mode of delivery:
Face to face teaching.
Learning activities and teaching methods:
36 h lectures.
Target group:
All students in geosciences.
Prerequisites and co-requisites:
It is recommended that the student has completed studies equivalent to the Bachelor's degree in geology.
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:
Lehtinen, M., Nurmi, P. and Rämö, T. (2005) Precambrian Geology of Finland. 736 p. Elsevier. Additional material delivered during the course.
The availability of the textbooks can be checked via this link.
Assessment methods and criteria:
Written essay.
Grading:
In the theory exam grade and final grade, the course utilizes a numerical grading scale of 1-5. Zero stands for a fail.
Person responsible:
Eero Hanski.
Working life cooperation:
No.

772640S: Excursion, 5 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 credits
Language of instruction:
English
Timing:
4th or 5th year
Learning outcomes:
The objective is to widen the student's field experience. Through exposure to novel geologic environments, students will have learnt to appreciate the diversity of geologic processes and environments on Earth.
Contents:
Introduction to Finnish or foreign geological field targets. Excursions typically last 1-2 weeks and consist of visits to field outcrops, as well as discussion of exposed structures and rocks. Past excursions went to Finland, Spain, South Africa, Norway and Iceland.
Mode of delivery:
Face to face in field or mine.
Learning activities and teaching methods:
Pre-excursion seminar, field techniques, excursion.
Target group:
Master students and PhD students in geology.

Recommended or required reading:
Other reading will be informed separately depending on excursion destination.
Assessment methods and criteria:
Pre-excursion seminar, field protocol.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Pass/fail
Person responsible:
N.N.
Working life cooperation:
No

772691S: Exploration and mining - global to local perspectives, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 cr
Language of instruction:
English
Timing:
4th or 5th year
Learning outcomes:
Upon completion of the course the students should know the structure of the mining and exploration industry. This includes the major players in a variety of commodity spaces, such as copper, gold, iron ore, base metals, etc., the concepts of value chain and variable business models. In particular, the differences between resources and reserves and economic drivers of the industry (demand and supply, changes in applications, commodity speculation) will be discussed. Furthermore, strategies and methods for exploration suitable for certain ore deposits types will be reviewed.
Contents:
Based on global and regional scale examples and developments an understanding will be developed for the dynamics of the business cycle in the raw materials industry.
Mode of delivery:
Face to face
Learning activities and teaching methods:
Lectures 30 h, hand-specimen examination, home work on reserve and resource calculations, and ore values. Also, group assignment and presentations on a subject such as mining company profiles, exploration methodologies etc.
Target group:
Masters students and PhD students in geoscience or related fields. Course is also suitable for interested geography or economics students with a background/interest in geosciences and natural resources.
Prerequisites and co-requisites:
Ore geology and society (Intermediate level course: 772386A)
Recommended optional programme components:
493301A Mining geophysics
774636S Geochemistry of mining environment
772632S Regional Ore Geology of Fennoscandia
774637S Isotope geochemistry for economic geologists
772694S Geometallurgy and mineral processing
Recommended or required reading:
Crowson, P. (2008) Mining unearthed. Aspermont, 423 p.
Wellmer, F.W., Dalheimer, M., Wagner, M. (2008) Economic valuations in exploration. Springer 174 p.
Eilu P (Ed.) (2012) Mineral deposits and metallogeny of Fennoscandia. Geological Survey of Finland, Special Paper 53, 401 p.,
Maier, W., O'Brien, H., Lahtinen, R. (Eds.) (2015) Ore Deposits of Finland. Elsevier, 792 p.
The availability of the literature can be checked from this link.
Assessment methods and criteria:

Examination
Grading:
5-1/fail
Working life cooperation:
No
Other information:
The study module can be replaced by the study module 493609S Mining environment and society.

774636S: Geochemistry of Mining Environment, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Strand

Opintokohteen kielet: Finnish

ECTS Credits:
5 ECTS.
Language of instruction:
The language of instructions is Finnish or English, depending on the participants.
Timing:
The course is held in the spring semester, during period IV. It is recommended to complete the course at the 4th or 5th spring semester.
Learning outcomes:
Upon completion of this course, the student will:
can describe and assess environmental problems associated with metal mining
are familiar with the chemical and mineralogical phenomena related to acid mine drainage
know how to test the acid-producing or acid-neutralizing capacity of rock types.
Contents:
Oxidation of sulphidic ores, formation of secondary minerals, water chemistry in mining environment, acid neutralisation capacity of rocks waste and its determination, factors involved in acid mining drainage (AMD) and its mitigation.
Mode of delivery:
Face to face teaching.
Learning activities and teaching methods:
28 h lectures.
Target group:
All students in geosciences.
Prerequisites and co-requisites:
Completion of 774301A Basic Course in Geochemistry and other studies equivalent to Bachelor's degree are recommended.
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:
Articles (informed separately) from the following books: Jambor, J. L., Blowes, D. W., Ritchie, A. I. M. (Eds.) (2003) Environmental Aspects of Mine Wastes, Mineralogical Association of Canada, Short Course Series, Vol. 31, 430 s., Plumlee, G.S., Logsdon, M.J. (Eds.) (1999) The Environmental Geochemistry of Mineral Deposits. Reviews in Economic Geology, Vol. 6A., Blowes et al. (2014) The Geochemistry of Acid Mine Drainage, Treatise in Geochemistry, Vol. 9. The availability of the textbooks can be checked via this link.
Assessment methods and criteria:
Written essay.
Grading:
In the theory exam grade and final grade, the course utilizes a numerical grading scale of 1-5. Zero stands for a fail.
Person responsible:
Prof. Eero Hanski
Working life cooperation:
No.

772666S: Master's thesis, 30 op

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
35 credits
Language of instruction:
Finnish, English
Timing:
5th year
Learning outcomes:
Upon completing a Master’s thesis, students will gain advanced understanding on a subject belonging economic geology or geology and mineralogy in generally. They will be able to use and apply pertinent research methods and theoretical knowledge of their research field, make independent inferences from their observations and measurements, and utilise effectively scientific literature.
Mode of delivery:
Students carry out a personal research project, which is normally based field and/or laboratory work, and they write a Master’s thesis (pro gradu) on the results. The topic of the thesis is agreed with the supervisor from the department and with other potential internal or external supervisors. Personal guidance is given by the supervisor(s) during the research and writing stage. The official reviewers of the thesis are decided by the chair of the educational programme board of the department after the proposal of the professor of the discipline and the thesis is accepted and rated by the educational programme board.
Target group:
All Master's level geoscience students.
Prerequisites and co-requisites:
Sufficient amount of intermediate- and advanced-level courses to enable the student to start independent research work.
Recommended or required reading:
Reading is decided separately in each case.
Assessment methods and criteria:
Thesis
Read more about assessment criteria at the University of Oulu webpage.
Grading:
5-1/fail
Person responsible:
Professors, lecturers
Working life cooperation:
Yes (commonly)

780699S: Maturity Test, 0 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Chemistry

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:
0 credits / 2 hours of work
Language of instruction:
Finnish or English
Timing:
5th year
Learning outcomes:
Upon completition of the essay-type maturity test the student has shown that he/she has knowledge of the topic of the research area.

Contents:
Maturity test will be agreed with the responsible person of the Master's Thesis. For the Maturity test can be accepted an abstract from Master's Thesis.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
The abstract from The Master's Thesis.
Target group:
Chemistry, compulsory
Prerequisites and co-requisites:
Master's Thesis
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:
Master's Thesis
Assessment methods and criteria:
The abstarct from the Master's Thesis
Read more about assessment criteria at the University of Oulu webpage.
Grading:
The course utilizes verbal grading scale pass/fail.
Person responsible:
Matti Niemelä
Working life cooperation:
No
Other information:
Responsible teachers for the course: Chemistry Degree program Professors, Docents, Lectures and Doctor level researchers.

773655S: Sedimentology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opettajat: Kari Strand

Opintokohteen kielet: Finnish, English

ECTS Credits:
5 credits
Language of instruction:
Finnish (optionally English)
Timing:
4th or 5th study year
Learning outcomes:
Upon completion of the course, the student will be able to explain how different sediment bedforms and sedimentary associations are related to different sedimentary environments. The student will also be able link individual observations to various sedimentary processes and their products, understand facies analysis method and explain the fundamental concepts used in sequence stratigraphy.
Contents:
The topics that are introduced in the course are: sedimentary environments their processes and products, basin analysis and sequence stratigraphy.
Mode of delivery:
Face to face
Learning activities and teaching methods:
30 h lectures
Target group:
Advanced-level geology students.
Prerequisites and co-requisites:
Bachelor of Science degree

Recommended or required reading:
Applicable parts of Reading, H.G. (1996) Sedimentary Environments. Blackwell Science Ltd. 688 s. and Coe, A.L. (2005) The Sedimentary Record of Sea-level Change. Cambridge University Press. 287 p. Lecture notes.
Assessment methods and criteria:
Examination
Grading:
5-1/fail
Person responsible:
Kari Strand
Working life cooperation:
No

773616S: Aerial photo interpretation in surficial geology, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 ECTS / 133 hours of work
Language of instruction:
Finnish or English
Timing:
4th or 5th study year (IV period)
Learning outcomes:
Upon completion of the course, students should be able to identify and interpret basic landforms from air photographs.
Contents:
Introduction to the principles of remote sensing techniques. Geomorphological mapping using Digital elevation models (DEMs). In practicals students produce surficial geological and glaciodynamic maps based on DEM interpretation of landforms.

Mode of delivery:
Face to face in class

Learning activities and teaching methods:
20 h lectures, 30 h exercises
Target group:
Master’s level geoscience students
Prerequisites and co-requisites:
Quaternary geology of Finland (773306A), Basics of glacial geology (773344A)

Assessment methods and criteria:
Pre-examination, exercises and written examination

Grading:
5-1/fail
Person responsible:
Juha Pekka Lunkka
Working life cooperation:
No

773631S: Biostratigraphy, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail
Opettajat: Tiina Eskola
Opintokohteen kielet: English

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 behavior 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. Properties and behaviour of underground water including geohydrological and hydrogeophysical aspects of water and hydrogeology. Behaviour and properties of water in soil, superficial deposits and bedrock, particularly in Finland. Groundwater flow, aquifers, groundwater quality, geological and geophysical research methods in hydrogeology
Mode of delivery:
Face to face
Learning activities and teaching methods:
50 h lectures and exercises
Target group:
Mining engineering and Mineral processing/ option Applied geophysics, geoscience students, other students of the University of Oulu.
Prerequisites and co-requisites:
Recommended: I494301A Geophysical research methods of rock and soil
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:
Applied Hydrogeology. C.W. Fetter (2001 fourth edition)
Physical and Chemical Hydrogeology. P.A Domenico & F.W. Schwartz, 1997 second edition.
Maanalaiset vedet - pohjavesigeologian perusteet; Korkka-Niemi, K. & Salonen, V-P. Täydennyskoulutuskeskus. Turun yliopisto. 1996. 181 s
Pohjavesi ja pohjaveden ympäristö. Mälkki, E. Tammi. 1999 304 s.
Assessment methods and criteria:
Varying assessment and evaluation methods.

Grading:
1-5/fail
Person responsible:
Kari Moisio
Working life cooperation:
No work practice

772696S: Quantitative Evaluation of Minerals in Sediments and Rocks, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 cr
Language of instruction:
English
Timing:
4th or 5th study year
Learning outcomes:
Upon completion of the course, the student will be able to do quantitative mineral evaluations for sediments and rocks. Optical microscopy, electron microprobe (EMPA), scanning electron microscopy (SEM) and QEMSCAN studies of specific samples are learned to identify useful minerals e.g. ore indicator minerals and quantify their relative abundances especially when looking for base metals or critical metals and minerals. Automated mineralogy systems are introduced to let you obtain data about your samples, such as mineralogical composition, mineral grain`s composition, rock minerals distribution, minerals elements distribution and includes in minerals.
Contents:
The topics that are introduced in the course are: what is a quantitive mineral evaluation, what materials can be studies and for what purposes, analytical equipments needed, examples of research results and own learning exercise.
Mode of delivery:
Face to face
Learning activities and teaching methods:
24 h lectures and exercise
Target group:
Advance level geoscience students
Prerequisites and co-requisites:
Bachelor of Science degree
Recommended or required reading:
Announced separately
Assessment methods and criteria:
Attending lectures and written examination
Grading:
5-1/fail
Person responsible:
Kari Strand
Working life cooperation:
No

773300A: Quaternary Stratigraphy, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opettajat: Pertti Sarala

Opintokohteen kielet: Finnish

ECTS Credits:
5 credits.
Language of instruction:
Finnish.
Timing:
4th year.
Learning outcomes:
Upon completion of the course, the student knows and understand:
identification of stratigraphical units in vertical deposition context
lateral stratigraphical correlation (horizontal)
chronostratigraphy including dating methods, age estimation and depositional timing
classical glacial stages
quaternary geological stages in Finland
Contents:
During the course students learn main concepts and research methods of the Quaternary stratigraphy. Furthermore, students learn main changes of climate and environment in global and Finnish scale during Quaternary.
Mode of delivery:
Face to face teaching.
Learning activities and teaching methods:
24 hours of guided teaching.
Target group:
Students in the 4th or 5th year.
Prerequisites and co-requisites:
The prerequisite is the completion of the following courses prior to enrolling for the course: Geologian peruskurssi II (771114P), Johdatus Suomen maaperägeologiaan ja maaperän raaka-ainevaroihin (771116P) and Glasiaaligeologian perusteet (773344A) or similar knowledge.
Recommended or required reading:
Ehlers, J. 1996: Quaternary and Glacial Geology, applicable parts (chapters 9-16), Wiley & Sons, New York. ; Lowe, J.J. & Walker, M.J.C. 1997: Reconstructing Quaternary Environments, (chapters 1, 3, 5, 6, 7), Longman, Hong Kong, 2. Edition, and Stratigraphic Guide, International Commission on Stratigraphy, electronic source, available at http://www.stratigraphy.org/. Other materials delivered during the course.

The availability of the literature can be checked from this link.
Assessment methods and criteria:
Participation in the lectures, activity in private or group works and final examination. The assessment of the course is based on the learning outcomes of the course. The more detailed assessment criteria are available on the Noppa Study Portal. Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5/fail.
Person responsible:
Pertti Sarala
Working life cooperation:
No.

773348A: Technical properties of sediments II, 5 op

Voimassaolo: 01.08.2016 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

772675S: Geophysics in economic geology, 5 op

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opettajat: Elena Kozlovskaya

Opintokohteen kielet: English

ECTS Credits:
5 credits
Language of instruction:
English
Timing:
4th or 5th year
Learning outcomes:
The students comprehend the main techniques used in exploration geophysics and have become familiar with a number of casa studies. They should be able to interpret basic geophysical data and their importance in target evaluation.
Contents:
Geophysical methods in exploration and their use in exploration targeting.
Mode of delivery:
Face to face
Learning activities and teaching methods:
30 h lectures, data interpretation exercises.
Target group:
Master's students and PhD students in geology.
Prerequisites and co-requisites:
Bachelor's degree.
Recommended or required reading:
Reynolds, J.M. (2011) An Introduction to Applied and Environmental Geophysics, Wiley-Blackwell
Everett M.E. (2013) Near-Surface Applied Geophysics. Cambridge University Press.
Kearey, P., Brooks, M., Hill, I. (2002) An Introduction to Geophysical Exploration. Blackwell Science.
Geophysical methods, in: Moon et al. (2009) Introduction to Mineral Exploration, Blackwell
The availability of the literature can be checked from " this link".

Assessment methods and criteria:
Examination
Read more about assessment criteria at the University of Oulu webpage.
Grading:
5-1/fail
Person responsible:
Elena Kozlovskaya
Working life cooperation:
No
Other information:
-

774639S: Isotope geochemistry for economic geologists, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Advanced 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 or English, depending in the participants.
Timing:

The course is held in the spring semester, during period III. It is recommended to complete the course at the 4th or 5th spring semester.
Learning outcomes:
Upon completion of this course, the student will:
can interpret and assess geological literature where isotopes have been utilizedis able to calculate ages of rocks using given isotope measurements of different isotopic systems,can make inferences on the origin of different rocks types, including ore deposits, based on measured isotope ratios.
Contents:
Mechanisms of radioactive disintegration; mass spectrometry; different radiogenic and stable isotope systems (e.g., Rb-Sr, Sm-Nd, Re-Os, Lu-Hf, Sm-Nd and U-Pb and Pb-Pb; S and C isotopes); examples of the use of isotopes in the research of ore deposits.
Mode of delivery:
Face to face teaching.
Learning activities and teaching methods:
32 h lectures, 16 h computer exercises.
Target group:
All students in geosciences.
Prerequisites and co-requisites:
It is recommended that the student has completed studies equivalent to the Bachelor's degree in geology.
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:
White, W.M. (2015) Isotope Geochemistry. Wiley-Blackwell, 496 p. or Dickin, A.P. (2005) Radiogenic Isotope Geology, 2nd edition, Cambridge University Press, 492 p. Journal articles given during the course.
The availability of the textbooks can be checked via this link.
Assessment methods and criteria:
Theory exam and excel calculations made at home.
Grading:
In the theory exam grade and final grade, the course utilizes a numerical grading scale of 1-5. Zero stands for a fail. Calculations are graded as pass/fail.
Person responsible:
Eero Hanski.
Working life cooperation:
No.

772695S: Magmatic ore deposits, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opettajat: Shenghong Yang

Opintokohteen kielet: English

ECTS Credits:
5 credits
Language of instruction:
English
Timing:
4th or 5th year
Learning outcomes:
After completion of the course students should have knowledge of the occurrence of the most important magmatic ore deposits, including PGE- Ni-Cu, Cr, V-Ti, apatite, and diamond deposits. Students are familiar with the geology, and can comprehend the petrogenesis, of the main Finnish and global magmatic mineral deposits, including the deposits at Kemi (Cr), Portimo and Penikat (PGE), and Kevitsa (Ni-Cu-PGE), Mustavaara (Fe-Ti-V) and Otanmäki (Fe-Ti-V) as well as global deposits including the Bushveld (PGE, Cr, V), Pechenga (Ni), Monchegorsk (PGE), Noril' sk (Ni-Cu-PGE), Sudbury (Ni-Cu-PGE), Kambalda (Ni), Jinchuan (Ni-Cu-PGE) and Panzhihua (Fe-Ti-V). Students will thus have gained an improved capability to contribute to exploration for magmatic ore deposits in Finland.
Contents:
Global distribution, geology and petrogenesis of magmatic ore deposits.

Mode of delivery:
Face to face
Learning activities and teaching methods:
Lectures 30 h, hand-specimen examination, microscopy sessions, exploration modelling.
Target group:
Masters students and PhD students in geology.
Prerequisites and co-requisites:
Igneous Petrology (772341A).
Recommended optional programme components:
Other courses in the International Master's course.
Recommended or required reading:
Li C and Ripley EM (2011) Magmatic Ni-Cu and PGE deposits: geology, geochemistry, and genesis. Reviews in Economic Geology, vol. 17, Society of Economic Geologists; Hedenquist JW et al. (2005) Economic Geology 100 th Anniversary volume, Society of Economic Geologists, 1136 p.
Assessment methods and criteria:
Examination
Grading:
5-1/fail
Person responsible:
Sheng-Hong Yang
Working life cooperation:
No

772697S: Microscopic study of rocks, 5 op

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 ESTC /40 h face to face + 40 students own work
Language of instruction:
Finnish or English
Timing:
spring semester period 3 or 4
Learning outcomes:
Upon completion of the course the student will:
have a competence to study major rock types with petrographic microscope and has a good understandin on their classification and textures
Contents:
classification of major rock types, their textures and their study with petrographic microscope
Mode of delivery:
Face to face and self-acting studies of samples (thin sections)
Learning activities and teaching methods:
face to face practicals 40 h and self-acting microscopy 40 h
Target group:
all studends in geosciences
Prerequisites and co-requisites:
Petrology of Igneous rocks, Petrology of Sedimentary Rocks, Petrology of Metamorphic Rocks, Optical Mineralogy
Recommended optional programme components:
The cours edoes not require other studies to be carries simultaneously
Recommended or required reading:
Handbooks situated in the course room according to separate list
Assessment methods and criteria:
report of the practical studies of given samples
Grading:
pass/fall
Person responsible:

Pekka Tuisku
Working life cooperation:
not currently

772632S: Regional ore geology of Fennoscandia, 5 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opettajat: Shenghong Yang

Opintokohteen kielet: English

ECTS Credits:
5 credits
Language of instruction:
English
Timing:
4th or 5th year
Learning outcomes:
After the course students should have an understanding of the occurrence and petrogenesis of the most important ore deposits in Fennoscandia, and their main analogues in a global context. Students will thus have gained an improved capability to contribute to mineral exploration in Finland.
Contents:
Factors that control temporal and spatial distribution of ores, with particular focus on Finnish and Fennoscandian ore deposits, including the Finnish VMS (Pyhäsalmi, Outokumpu), chromite (Kemi), PGE (Portimo, Penikat, Konttijärvi), vanadium (Mustavaara, Koitelainen), Fe (Kolari district, Otanmäki), gold (Suurikuusikko, Pahtavaara, Pampalo), and Ni deposits (Kevitsa, Talvivaara, Vammala-Kotalahti belt), the Swedish Kiruna and Skelefteå districts, the Pechenga deposit of Russia, and the Norwegian Fe-Ti deposits.
Mode of delivery:
Face to face
Learning activities and teaching methods:
Lectures 30 h, handspecimen examination
Target group:
Masters students and PhD students in geology.
Prerequisites and co-requisites:
Ore Geology (772385A), Igneous Petrology (772341A), Metamorphic Petrology (772345A), Introduction to Ore Mineralogy (772335A).
Recommended optional programme components:
Other courses of the International Master programme.
Recommended or required reading:
Eilu P (Ed.) (2012) Mineral deposits and metallogeny of Fennoscandia **.** Geological Survey of Finland, Special Paper 53. 401 p., Maier, W., O'Brien, H., Lahtinen, R. (Eds.) (2015) Ore Deposits of Finland. Elsevier.
The availability of the literature can be checked from this link.
Assessment methods and criteria:
Examination
Read more about assessment criteria at the University of Oulu webpage.
Grading:
5-1/fail
Person responsible:
N.N.
Working life cooperation:
No

772667S: Seminar in ore geology, 5 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Oulu Mining School

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 credits
Language of instruction:
English
Timing:
4th or 5th year
Learning outcomes:
The course will enhance students' ability to construct and deliver a scientific presentation and deepen their knowledge on different ore types. Students will be able to summarize the geology and petrogenesis of selected ore deposits and present these data to a specialist audience.
Contents:
Students write a 20-page paper on a subject in the field of ore geology. The paper is presented in a seminar meeting with someone acting as an opponent. Each student acts as an opponent to a paper in their turn.
Mode of delivery:
Face to face
Learning activities and teaching methods:
Independent literature studies, oral presentations by students,seminars c. 20 h.
Target group:
Masters and PhD students.
Prerequisites and co-requisites:
Bachelor,s degree.
Recommended or required reading:
Journal papers and Eilu P (Ed.) (2012) Mineral deposits and metallogeny of Fennoscandia. Geological Survey of Finland, Special Paper 53. 401 p
The availability of the literature can be checked from " this link".
Assessment methods and criteria:
Oral presentation and acting as an opponent.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Pass/fail
Person responsible:
Eero Hanski
Working life cooperation:
No