

Opasraportti

FTech - Courses in English for exchange students, Field of Mechanical Engineering (2019 - 2020)

Courses in English for Exchange Students in the Study Field of Mechanical Engineering at the Faculty of Technology during the Academic Year 2019-20

This Course Catalogue lists the Mechanical Engineering courses taught, or otherwise available in English for exchange students during the academic year 2019-20.

Course languages: Most of the Mechanical Engineering courses are lectured in Finnish, but there is an alternative method for completing the course in English: E.g. a book exam = the course has reading materials (self-study materials: books, lecture notes, etc.) available in English and these materials replace the lectures taught in Finnish. Possible practical exercises and final exams are taught/given in English.

Course availability: The listed courses are available for **exchange students hosted by the Faculty of Technology / Study Field Mechanical Engineering, if they have the previous knowledge requirements** of the course. Exchange students hosted by other University of Oulu faculties usually cannot take these courses especially if they do not have the required previous knowledge. They must contact the Exchange Coordinator of the Faculty of Technology (contact info below) to ask if it is possible to participate.

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

For information on the exchange application process please see www oulu.fi/university/studentexchange. All exchange applicants must submit their exchange application through SoleMOVE by the deadline given, proposed study plan is attached to the on-line application.

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

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

Teaching periods for 2019-20

Autumn term 2019

Period 1: Sept 2 - Oct 25, 2019

Period 2: Oct 28 – Dec 20, 2019

Spring term 2020

Period 3: Jan 7 – March 6, 2020

Period 4: March 9 – May 8, 2020

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

Any questions on the Mechanical Engineering courses at the Faculty of Technology should be addressed to:

M.Sc. Marita Puikkonen
 Faculty International Coordinator
 for Student Exchange
 Incoming & Outgoing Mobility
 Faculty of Technology, University of Oulu, Finland
 Email: **Study.Technology(at)oulu.fi**

Further information on application process and services for incoming exchange students:
www oulu.fi/university/studentexchange or international.office(at)oulu.fi

Tutkintorakenteisiin kuulumattomat opintokokonaisuudet ja -jaksot

900013Y: Beginners' Finnish Course 1, 3 op
 900053Y: Beginners' Finnish Course 2, 5 op
 461111S: Continuum mechanics, 5 op
 900054Y: Conversational Skills in Finnish, 3 op
 461106A: Dynamics, 5 op
 461110S: Fluid mechanics, 5 op
 462101A: Information technology and machines, 5 op
 900015Y: Intermediate Finnish Course 1, 5 op
 900016Y: Intermediate Finnish Course 2, 5 op
 462105A: Machine Sensor Technology, 5 op
 462104A: Machine automation, 5 op
 462107A: Maintenance of machines, 5 op
 461101A: Mathematical Analysis in Mechanical Engineering, 5 op
 461114S: Mechanics of composites, 5 op
 462106A: Precision engineering, 5 op
 465103A: Principles of metal shaping and forming, 5 op
 900027Y: Special Course in Finnish: Writing Skills, 3 op
 461102A: Statics, 5 op
 461103A: Strength of materials I, 5 op
 900017Y: Survival Finnish, 2 op
 461105A: Technical thermodynamics, 5 op

Opintojaksojen kuvaukset

Tutkintorakenteisiin kuulumattomien opintokokonaisuuksien ja -jaksojen kuvaukset

900013Y: Beginners' Finnish Course 1, 3 op

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay900013Y Beginners' Finnish Course 1 (OPEN UNI) 2.0 op

Proficiency level:

A1.2

Status:

The course is intended for the international students in every faculty of Oulu University.

Required proficiency level:

A1.1, Completion of the Survival Finnish course (900017Y) or the equivalent language skills.

ECTS Credits:

3 ECTS credits

Language of instruction:

As much Finnish as possible; English will be used as a help language.

Timing:

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Learning outcomes:

By the end of the course the student can understand and use some familiar and common everyday expressions relating to her/himself and everyday situations. S/he can interact in a simple way provided the other person talks slowly and clearly and is willing to help. The student is able to read short simple texts and messages dealing with familiar topics. S/he also deepens her/his understanding of the Finnish language and communication styles.

Contents:

This is lower elementary course which aims to help students to learn communication skills in ordinary everyday situations. During the course, students broaden their vocabulary and knowledge of grammar and principles of pronunciation. They also practise to understand easy Finnish talk about everyday subjects, and reading and writing short and simple texts/messages.

The topics and communicative situations covered in the course are: talking about oneself, one's family, studies and daily routines, as well as asking about these things from other person, expressing opinions, describing people and things, talking about weather and seasons, the names of the months and colours.

The structures studied are: verb types, basics of the change of the consonants k, p and t in verbs and nouns, the genitive and partitive cases, possessive structure, some declension types for nouns (word types) and the basics of the local cases.

Mode of delivery:

Contact teaching and guided self study

Learning activities and teaching methods:

Lessons 2 times a week (26 h, including the final exam) and guided self study (55 h)

Target group:

International degree and post-graduate degree students and exchange students of the University

Prerequisites and co-requisites:

Completion of the Survival Finnish Course

Recommended optional programme components:

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Recommended or required reading:

Gehring, S. & Heinzmann, S. Suomen mestari 1 (chapters 3 - 5)

Assessment methods and criteria:

Regular and active participation in the weekly lessons (twice a week), homework assignments and written exam at the end of the course will be observed in assessment.

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

Grading:

Grading scale is 1-5.

Person responsible:

Anne Koskela

Working life cooperation:

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Other information:

Sign-up in WebOodi. The course will start right after the Survival Finnish course.

900053Y: Beginners' Finnish Course 2, 5 op

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay900053Y Beginners' Finnish Course 2 (OPEN UNI) 4.0 op

Proficiency level:

A1.3

Status:

The course is intended for the international students in every faculty of Oulu University.

Required proficiency level:

A1.2, completion of the Beginners' Finnish course 1 (900013Y) or the equivalent language skills.

ECTS Credits:

5 ECTS credits

Language of instruction:

As much Finnish as possible; English will be used as a help language.

Timing:

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Learning outcomes:

By the end of the course the student can understand and use some very common everyday expressions and sentences. S/he can communicate in easy and routine tasks requiring a simple and direct exchange of information on familiar everyday matters. The student understands different kinds of short texts. S/he can for example locate important information in them. In addition, s/he has acquired more detailed knowledge of the language and culture.

Contents:

This is a post-elementary course. During the course students learn more about communication in ordinary everyday situations in Finnish. They also extend their vocabulary and knowledge of grammar. Students practise understanding simple Finnish talk and short texts.

The topics and communicative situations covered in the course are: asking for and giving directions, asking for help/favours, carrying out transactions in shops and restaurants, talking about the past, asking for and expressing opinions and feelings, accommodation, travelling, vehicles, work, professions, food, drink and parties.

The structures studied are: the local cases, nominative plural (basic form plural), imperfect (past tense of verbs), part of the imperative, more declension types for nouns (word types), more about the change of the consonants k, p and t in verbs and nouns, declension of the demonstrative pronouns and personal pronouns, more about the partitive case, basics of the object cases, postpositions and some sentence types in Finnish.

Mode of delivery:

Contact teaching and guided self study

Learning activities and teaching methods:

Lessons 2 times a week (52 h, including the tests) and guided self study (83 h)

Target group:

International degree and post-graduate degree students and exchange students of the University

Prerequisites and co-requisites:

Completion of the Beginners' Finnish Course 1

Recommended optional programme components:

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Recommended or required reading:

Gehring, S. & Heinzmann, S.: **Suomen mestari 1** (kappaleet 6-9)

Assessment methods and criteria:

Regular and active participation in the weekly lessons (twice a week), homework assignments and tests will be taken into consideration in the assessment.

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

Grading:

Grading scale is 1-5.

Person responsible:

Anne Koskela

Working life cooperation:

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Other information:

Sign-up in WebOodi. The lessons will be held **twice a week** during a 13-week period.

461111S: Continuum mechanics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Mechanical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Koivurova Hannu

Opintokohteen kielet: Finnish

Leikkaavuudet:

461026S-01 Continuum Mechanics, examination 0.0 op

461026S-02 Continuum Mechanics, exercises 0.0 op

461026S Continuum Mechanics 6.0 op

ECTS Credits:

5 ECTS credits / 90 hours of work

Language of instruction:

Finnish

Timing:

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

Learning outcomes:

The aim of this course is to provide an introductory understanding of continuum mechanics, the fundamental concepts and methods used in the mathematical modeling of solids and the engineering use of mechanistic models and analysis techniques. Learning outcomes: Upon completing the required coursework, the student knows the theoretical background of the strength of materials and he/she is able to the use of specialized literature as a source of further information. The student is able to apply the fundamentals of tensor calculus in the orthogonal coordinate system and knows the most important characteristics of the second order symmetric tensor. He/she is able to explain the differences both on the description of linear and nonlinear deformation and on the Eulerian and Lagrangian description. The student is able to calculate the most important measures of the deformation and strain. He/she recognizes the different measures of stress in the different configurations, and can transform them in to the different configurations. He/she is able to identify the symmetries of the linear elastic material and is able to use the constitutive equation and constants of the isotropic linear elastic material.

Contents:

Fundamentals of tensor calculus; State of deformation and stress in the linear and non-linear theory; Basic conservation laws in continuum mechanics; Constitutive properties of materials; Introduction of linear elasticity and three dimensional plasticity.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

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

Recommended optional programme components:

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

Recommended or required reading:

Mase, G., Smelser, R., Mase, G. (2010) Continuum Mechanics for Engineers. CRC Press Inc. Oheiskirjallisuus: Malvern, L. (1969) Introduction to the mechanics of a continuous medium. Prentice-Hall, Englewood Cliffs; Mattiasson, K. (1981) Continuum mechanics principles for large deformation problems in solid and structural mechanics. Publ. 81:6, Department of Structural Mechanics, Chalmers University of Technology; Fung, Y. (1965) Foundations of solid mechanics. Prentice-Hall, Englewood Cliffs.

Assessment methods and criteria:

The final grade is based on the combined points from exercises and final exam. The assessment of the course is based on the learning outcomes of the course. The more detailed assessment criteria are available on the Optima Study Portal.

Grading:

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

Person responsible:

University Lecturer Hannu Koivurova

900054Y: Conversational Skills in Finnish, 3 op

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Proficiency level:

B1/B2 , according to the Common European Framework.

Status:

The course is intended for the international students in every faculty of University of Oulu.

Required proficiency level:

A2.2

Completion of Intermediate Finnish 2 (900016Y) or the equivalent language skills.

ECTS Credits:

3 ECTS credits

Language of instruction:

Finnish

Timing:

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Learning outcomes:

By the end of the course the student can interact with a degree of fluency (and spontaneity) that makes regular interaction with native speakers quite possible. S/he can describe and explain (clearly and in detail) on a wide range of objects, experiences and events, dreams, hopes and ambitions. The student can bring out opinions, give reasons and explanations for them and explain a viewpoint on a topical issue giving the advantages and disadvantages of various options. S/he is also able to give a (clear) prepared presentation and answer the questions posed by the audience.

Contents:

During the course students strengthen their communication skills in formal and informal situations. The goal is to activate the student's Finnish skills and encourage him/her to use them in different situations. There will be various types of situational dialogue, conversation and listening exercises in the course. In addition, students will conduct a short survey which will also be reported to other students in the class.

Mode of delivery:

Contact teaching and guided self study

Learning activities and teaching methods:

Lessons once a week (28-30 h), group work (15 h) and guided self study (36 h)

Target group:

International degree and post-graduate degree students, exchange students and the staff members of the University

Prerequisites and co-requisites:

Completion of Intermediate Finnish 2 (900016Y) or equivalent skills

Recommended optional programme components:

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Recommended or required reading:

Will be provided during the course.

Assessment methods and criteria:

To pass the course, students must attend class on a regular basis and complete group work tasks and homework assignments.

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

Grading:

Grading is on a pass/fail basis.

Person responsible:

Anne Koskela

Working life cooperation:

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Other information:

Sign-up in WebOodi.

461106A: Dynamics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Field of Mechanical Engineering**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Koivurova Hannu**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

461018A-01 Dynamics, examination 0.0 op

461018A-02 Dynamics, exercises 0.0 op

461018A Dynamics 4.0 op

ECTS Credits:

5 ECTS credits / 120 hours of work

Language of instruction:

Finnish

Timing:

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

Learning outcomes:

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

Contents:

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

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

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

Recommended optional programme components:

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

Recommended or required reading:

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

Assessment methods and criteria:

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

Grading:

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

Person responsible:

University Lecturer Hannu Koivurova

461110S: Fluid mechanics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Mechanical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Koivurova Hannu

Opintokohteen kielet: Finnish

Leikkaavuudet:

461036S-01 Heat and Mass Transfer II, examination 0.0 op

461036S-02 Heat and Mass Transfer II, exercises 0.0 op

461036S Heat and Mass Transfer II 3.5 op

ECTS Credits:

5 ECTS credits / 105 hours of work

Language of instruction:

Finnish

Timing:

The course is held in the autumn semester, during periods I and II.

Learning outcomes:

The aim of this course is to familiarize students with the physical principles of heat transfer and fluid mechanics and their applications. Upon completing the required coursework, the student is able to design machines for the production, transfer and use of energy. Moreover, he/she is able to calculate the amount of loads the flow directs towards the structures. The above requires that the student is able to explain the fundamentals of fluid statics and calculate its applications. He/she can explain the characteristics of flowing fluid and the fundamental concepts of the flow mechanics. The student is able to use mass, momentum and energy conservation equations to solve engineering fluid mechanics problems in a controlled volume. The student is able to determine the frictional losses, piping size and pump power requirements for laminar and turbulent flow in closed conduits for viscous and inviscid fluids.

Contents:

Introduction, dimension analysis and its applications; Fluid statics: Equilibrium equations, pressure center, stability of a floating body; Fluid dynamics: inviscid and viscid incompressible flow, basics of compressible flow, use of numerical methods; Technical applications including flow in pipes, wind loads and wave loads. Introduction to computational fluid mechanics.

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

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

Recommended optional programme components:

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

Recommended or required reading:

Nakayama&Boucher: Introduction to Fluid Mechanics, Bathsworth-Heideman, 2000.

Assessment methods and criteria:

The final grade is based on the combined points from exercises and final exam. The assessment of the course is based on the learning outcomes of the course. The more detailed assessment criteria are available on the Optima Study Portal.

Grading:

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

Person responsible:

University Lecturer Hannu Koivurova

462101A: Information technology and machines, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Mechanical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Liedes, Toni Mikael

Opintokohteen kielet: Finnish

ECTS Credits:

5 cr / 133 hours of work

Language of instruction:

Finnish

Timing:

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

Learning outcomes:

Upon completion of the course, the student will be able to explain how the information technology is utilized in modern machines. The student is able to describe how the modern machines are developed from purely mechanical systems to multi-disciplinary systems. The student is able to sort out the electrical, information technological and mechanical features of modern machines. He/she is also able to describe the interaction and interfaces of the aforementioned features. In addition to this, the student is able to separate the digital and analog domains. The student is able to create a simple computer program for machine control. He/she is able to name the sensors and actuators being used in automated machines. Furthermore, the student is able to list examples of machines taking advantage of modern information technology.

Contents:

History of mechanical engineering and information technology; Information technology as an enabler of the development of machines; Requirements and boundary conditions for automatization of machines; Concepts of information technology and electronics; Basics of programming and logical reasoning; Examples of machine applications taking advantage of modern information technology.

Mode of delivery:

Blended teaching

Learning activities and teaching methods:

Lectures 20 h / Group work 12 h / Self-study 101 h

Target group:

Bachelor's degree students of mechanical engineering

Recommended optional programme components:

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

Recommended or required reading:

Lecture notes. Other material is in the beginning of the course.

Assessment methods and criteria:

This course utilizes continuous assessment. During the course there are exercises and intermediate exams. The exercises and the exams will be assessed. The assessment of the course is based on the learning outcomes of the course. The more detailed assessment criteria are available on the Noppa Study Portal.

Grading:

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

Person responsible:

Lecturer Toni Liedes

900015Y: Intermediate Finnish Course 1, 5 op

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay900015Y Intermediate Finnish Course 1 (OPEN UNI) 4.0 op

Proficiency level:

A2.1

Status:

The course is intended for the international students in every faculty of University of Oulu.

Required proficiency level:

A1.3, Completion of the Beginners' Finnish course 2 (900053Y) or the equivalent language skills.

ECTS Credits:

5 ECTS credits

Language of instruction:

Mainly Finnish

Timing:

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Learning outcomes:

By the end of the course the student can communicate in ordinary everyday situations when the topics are familiar or connected with everyday matters. S/he can search for and locate key informational content in different kinds of texts. The student can also identify the topic and some details of the discussion around her/him. S/he can describe activities and personal experiences both orally and in writing and s/he also knows the difference between spoken/colloquial and written/standard language. The student knows how things can be expressed with different degrees of politeness and can apply that information in her/his own communication.

Contents:

The course is a lower intermediate course. During the course students strengthen their communication skills in ordinary everyday situations and acquire a wider vocabulary and more thorough knowledge of grammar. In addition, students practise understanding and producing Finnish talk and reading newspaper articles.

The topics and communicative situations covered in the course are: requesting different kinds of requests, expressing politeness, making appointments with friends, giving directions, doing the shopping, talking about the past and talking about his/her future plans, hobbies, transactions e.g. in the doctor's and post office.

The structures studied are: more about the imperative, the verb rections, the deverbal noun (-minen), passive present tense, part of the plural declension of nouns, the third infinitive (ma-infinitive), more about sentence types, perfect tense, more about object cases.

Mode of delivery:

Contact teaching and guided self study

Learning activities and teaching methods:

Lessons 2 times a week (52 h, including the tests) and guided self study (83 h)

Target group:

International degree and post-graduate degree students, exchange students and the staff members of the University

Prerequisites and co-requisites:

Completion of the Beginners' Finnish Course 2

Recommended optional programme components:

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Recommended or required reading:

Gehring, S. & Heinzmann, S.: **Suomen mestari 2**, (chapters 1 - 5)

Assessment methods and criteria:

Regular and active participation in the weekly lessons (twice a week), homework assignments and the tests will be taken into consideration in the assessment.

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

Grading:

Grading scale is 1-5.

Person responsible:

Anne Koskela

Working life cooperation:

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Other information:

Sign-up in WebOodi. The lessons will be held twice a week during a 13-week period.

900016Y: Intermediate Finnish Course 2, 5 op

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Proficiency level:

A2.2

Status:

The course is intended for the international students in every faculty of University of Oulu.

Required proficiency level:

A2.1, Completion of the Intermediate Finnish course 1 (900015Y) or the equivalent language skills.

ECTS Credits:

5 ECTS credits

Language of instruction:

Finnish

Timing:

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Learning outcomes:

By the end of the course the student can communicate in various informal situations in Finnish. The student understands the main points of messages and talk around her/him. S/he can produce simple connected text on topics which are familiar or of personal interest and describe experiences and also report heard content to others.

Contents:

The course is an upper intermediate course. During the course students learn the necessary written and oral skills to be able to cope in informal situations arising during everyday life, work and study. In the course, students practise understanding more Finnish talk and written texts, and finding information and talking about it to other people. In the classes the main stress is on oral exercises and group work.

The topics and communicative situations covered in the course are: transactions e.g. in clothes shops and on the phone, Finnish small talk, reacting in different situations, information and facts about Finnish feast culture and features of colloquial/spoken language.

The structures studied are: the perfect and pluperfect, revision of all the verb tenses, comparison of adjectives, conditional, more about the plural declension of nouns (particularly the plural partitive case), more about object and predicative cases, the passive imperfect.

Mode of delivery:

Contact teaching and guided self study

Learning activities and teaching methods:

Lessons twice a week (52 h, including the tests) and guided self study (83 h)

Target group:

International degree and post-graduate degree students, exchange students and the staff members of the University

Prerequisites and co-requisites:

Completion of the Intermediate Finnish Course 1 or equivalent skills

Recommended optional programme components:

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Recommended or required reading:

Gehring, S. & Heinzmann, S.: **Suomen mestari 2 (chapters 6 - 9)**

Assessment methods and criteria:

Regular and active participation in the weekly lessons (twice a week), homework assignments and the tests will be taken into consideration in the assessment.

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

Grading:

Grading scale is 1-5.

Person responsible:

Anne Koskela

Working life cooperation:

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Other information:

Sign-up in WebOodi.

462105A: Machine Sensor Technology, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Mechanical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Liedes, Toni Mikael

Opintokohteen kielet: Finnish

Leikkaavuudet:

462053A Sensor Technology of Machine Automation 5.0 op

ECTS Credits:

5 cr / 133 hours of work

Language of instruction:

Finnish

Timing:

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

Learning outcomes:

Upon completion of the course, the student will be able identify, classify and bring into use the most common sensor types used in machine automation. The student is able to choose sensors for typical automation applications. In addition to this, the student is able to design a common analog and digital signal transmission and conditioning chain.

Contents:

Basics measuring systems; Classification of sensors; Characteristics of analog and digital domain; Analog to digital conversion; Basics of analog signal conditioning: amplification, attenuation and filtering; Operating principle of digital sensors; Examples of typical sensors used in mechanical engineering and civil engineering;

Mode of delivery:

Blended teaching

Learning activities and teaching methods:

Lectures 32 h / Group work 16 h / Self-study 85 h

Target group:

Bachelor's degree students of mechanical engineering

Prerequisites and co-requisites:

The recommended prerequisite is the completion of the following courses prior to enrolling for the course: Actuators in Machine Automation

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:

de Silva, Clarence W. Mechatronics: An Integrated Approach. CRC Press, 2005, 1312 p. Chapters 4-7; Lecture notes.

Assessment methods and criteria:

This course utilizes continuous assessment. The assessment can be based on learning diary, exercises, seminars and exam. The more detailed assessment criteria are available on the Noppa Study Portal.

Grading:

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

Person responsible:

Lecturer Toni Liedes

462104A: Machine automation, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Mechanical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Louhisalmi, Yrjö Aulis

Opintokohteen kielet: Finnish

Leikkaavuudet:

462022S-01 Machine Automation II, examination 0.0 op

462022S-02 Machine Automation II, exercise work 0.0 op

462022S Machine Automation II 5.0 op

ECTS Credits:

5 cr / 133 hours of work

Language of instruction:

Finnish

Timing:

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

Learning outcomes:

Upon completion of the course, the student will be able to explain the basic principles and structures of a typical machine automation system. The student is able to divide an automation system into basic elements and explain their role and significance in the system. The student can apply the basic digital technology and logic methods in designing a typical machine automation system. In addition to this, the student knows the operating principles of programmable logic controllers (PLCs) and is able to implement a logic control for a typical application.

Furthermore, the student is able to explain the basic principles of fieldbuses.

Contents:

Basics of automation; Basics of digital technology and logic; Description of operation sequences; Architecture of programmable logic controllers and their programming; Distributed systems and fieldbuses.

Mode of delivery:

Blended teaching

Learning activities and teaching methods:

Lectures 32 h / Group work 16 h / Self-study 85 h

Target group:

Bachelor's degree students of mechanical engineering

Prerequisites and co-requisites:

The recommended prerequisite is the completion of the following courses prior to enrolling for the course:

Actuators in Machine Automation

Recommended optional programme components:

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

However, it is recommended to complete the course Machine Sensor Technology simultaneously.

Recommended or required reading:

Lecture notes. Other material is in the beginning of the course.

Assessment methods and criteria:

This course utilizes continuous assessment. The assessment can be based on learning diary, exercises, seminars and exam. The more detailed assessment criteria are available on the Noppa Study Portal.

Grading:

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

Person responsible:

University teacher Yrjö Louhisalmi

462107A: Maintenance of machines, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Mechanical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Jouni Laurila

Opintokohteen kielet: Finnish

Leikkaavuudet:

464087A-01	Maintenancy Technology, examination	0.0 op
464087A-02	Maintenancy Technology, exercise work	0.0 op
464087A	Maintenancy Technology	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 period 4. It is recommended to complete the course at the 3rd spring semester.

Learning outcomes:

Upon completion of the course, the student knows the different types of maintenance execution and can introduce what kind of points are connected to the choice of the maintenance strategy. The student knows the most common machine failure modes and consequences of them and can tell how the failures can be prevented. The student will recognize the effects of wearing and lubrication on the condition of machines and he/she is capable of explaining the basic concepts related to analysis of lubricants. The student knows the basics of the vibration measurement which are used in the condition monitoring of machines and can choose the suitable measuring and analysis methods for the identification of the most common machine faults. The student is familiar with the significance of maintenance in the production operation and he/she is able to apply the most important standards of the maintenance field.

Contents:

Maintenance strategies and organizing methods, standards of this field, failure modes, wearing and lubrication, basics and the most general methods of machine condition monitoring

Mode of delivery:

Face-to-face teaching

Learning activities and teaching methods:

Lectures 24 h / group work 36 h / self-study 75 h

Target group:

Bachelor's degree students in the mechanical engineering

Prerequisites and co-requisites:

The recommended prerequisite is the completion of the following course: 462103A Introduction to Maintenance

Recommended optional programme components:

The course is an independent entity

Recommended or required reading:

Lecture handout and the other material delivered during the course. Supplementary readings: Järviö, J. et al., Kunnossapito. Helsinki, KP-Media Oy / Kunnossapitoyhdistys ry 2007. Antila, K., et al., Teollisuusvoitelu, KP-Media Oy, 2003. Mikkonen, H. (toim.), Kuntoon perustuva kunnossapito, KP-Media Oy, 2009.

Assessment methods and criteria:

Final examination and the other graded assignments

Grading:

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

Person responsible:

Jouni Laurila

461101A: Mathematical Analysis in Mechanical Engineering, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Mechanical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Laukkanen, Jari Jussi

Opintokohteen kielet: Finnish

Leikkaavuudet:

460084P-01 Mathematical Analysis in Mechanical Engineering, examination 0.0 op

460084P-02 Mathematical Analysis in Mechanical Engineering, exercises 0.0 op

460084P Mathematical Analysis in Mechanical Engineering 7.0 op

ECTS Credits:

5 ects /135 hours of work

Language of instruction:

Finnish

Timing:

The lectures and weekly exercises are held during periods 1. - 2.

Learning outcomes:

Students can identify and solve various differential equations and they have knowledge on basic solvability of differential equations.

Contents:

Vectors, various differential equations, knowledge on basic solvability of differential equations.

Mode of delivery:

Face-to-face

Learning activities and teaching methods:

This course will be based on lectures 45 h and exercises 40 h and 45 h self-study during periods 1 – 2. Students are required to take a final exam or mid-term exams.

Recommended or required reading:

Grossman, S.I.: Multivariable Calculus, Linear Algebra and Differential Equations, 3rd ed., Saunders College Publishing, 1995 or 2nd ed, 1986, Glyn James, G.: Advanced Modern Engineering Mathematics, Addison-Wesley Publishing Company, 1993.

Assessment methods and criteria:

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

Grading:

Numerical grading scale 1-5.

Person responsible:

University Teacher Jari Iaukkanen

461114S: Mechanics of composites, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Mechanical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Lahtinen, Hannu Tapio

Opintokohteen kielet: Finnish

Leikkaavuudet:

461027S-01 Mechanics of Composites 0.0 op

461027S-02 Mechanics of Composites 0.0 op

461027S Mechanics of Composites 5.0 op

ECTS Credits:

5 ETCS / 120 hours of work

Language of instruction:

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

Timing:

The course is held in the autumn semester, during periods 1 and 2. It is recommended to complete the course at the 4th autumn semester.

Learning outcomes:

After the course, the student can use terminology of composite materials and their typical mechanical properties in the design of structures. He/she can explain how the elastic properties of anisotropic materials affect the mechanical behavior of laminated shells and plates and calculate stresses and strains of laminae and laminates. In addition, he/she is capable of analyzing bending, buckling and vibration problems of composite laminates by using the classical lamination theory and the finite element method.

Contents:

Terminology of composite materials. Elastic properties of anisotropic materials. Micro and macro mechanics of lamina. Macro mechanics of laminates. Bending, buckling and vibration of laminates. Principles of dimensioning of laminated structures.

Mode of delivery:

Implemented as Face-to-face -teaching

Learning activities and teaching methods:

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

Target group:

For master degree students of mechanical engineering programme.

Prerequisites and co-requisites:

The recommended preceding courses are 461103A Strength of Materials I and 461104A Strength of Materials 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:

Jones, R.M., Mechanics of Composite Materials, McGraw-Hill, 1975; Tsai, Composite Design, Think Composites, 1987; Vinson & Sierakowski, The Behaviour of Structures Composed of Composite Materials, Martinus Nijhoff, 1986.

Assessment methods and criteria:

The course is passed by a final exam. An independent exercise work is required. Participation to the exam is allowed after the accepted exercise work.

Grading:

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

Person responsible:

University teacher Hannu Lahtinen

Other information:

The principals of micro and macro mechanical behaviour of composite materials and their application in analyses and design of composite structures.

462106A: Precision engineering, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Mechanical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Louhisalmi, Yrjö Aulis

Opintokohteen kielet: English

Leikkaavuudet:

462038A-01	Precision Engineering, examination	0.0 op
462038A-02	Precision Engineering, exercise work	0.0 op
462038A	Precision Engineering	3.5 op

ECTS Credits:

5 cr / 133 hours of work

Language of instruction:

English

Timing:

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

Learning outcomes:

Upon completion of the course, the student can analyze structures and components used in precise engineering products, can explain working principles of them and can design new qualified and easily manufactured precise engineering products.

Contents:

Introduction, Housing and usability of devices, permanent and detachable joints, bearing and guidance design and on precise and micromechanical manufacturing methods.

Mode of delivery:

Blended teaching. The course is lectured in English, possible exercises are taught face to face. Final exam in English.

Learning activities and teaching methods:

The course consists of lectures and an exercise work and a final exam.

Target group:

Master's degree students of mechanical engineering

Recommended or required reading:

Lecture notes (in Finnish). Additional literature: Krause, W.: Grundlagen der konstruktion, elektronik, elektrotechnik, feinwerktechnik, 7 aufl., Hanser, 1994; Ullman, D.: The mechanical design process, 3. ed., McGraw-Hill, 2003.

Assessment methods and criteria:

Final exam. The grade of the course is based on a final examination. The student must pass the exercise work before taking the examination.

Grading:

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

Person responsible:

University teacher Yrjö Louhisalmi

465103A: Principles of metal shaping and forming, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Mechanical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Jari Larkiola

Opintokohteen kielet: Finnish

Leikkaavuudet:

465095A-01	Sheet Metal Forming	0.0 op
465095A-02	Sheet Metal Forming, literature review	0.0 op
465095A	Sheet Metal Forming	3.5 op

ECTS Credits:

5 / 135 h total study time

Language of instruction:

Finnish

Timing:

Autumn semester, periods I & II. Recommended for third study year.

Learning outcomes:

The object is to get students to understand the fundamentals of theory of plasticity. After course, student should have a readiness to apply theory of plasticity to metal forming analyses and to solve the simple stress distributions based on external loads.

Contents:

During course, common constitutive material models for different metals are examined. Processing methods effecting to the microstructure like rolling, forging, extrusion and wire drawing are included in course as like the sheet metal forming processes. In addition, e.g. the information from tensile tests is combined to the theory of plasticity and constitutive material models.

Mode of delivery:

Face to face

Learning activities and teaching methods:

Lectures, literature study and examination

Target group:

Compulsory in the Bachelor's stage for all Mechanical Engineering students majoring in Materials Engineering.

Prerequisites and co-requisites:

Before registering for this course the student must have successfully completed the following courses: 465101A An Introduction to Materials for Mechanical Engineering, 465102A Materials for Mechanical Engineering

Recommended or required reading:

Lecture notes, Korhonen, A. and Larkiola, J., Ohutlevyjen muovauksen perusteet, Actaoulu C1 2012, 207p

Assessment methods and criteria:

Final grade assessed on the basis of a final examination (weighting 0.8) and literature work (weighting 0.2).

Grading:

Examination scale 0-5 ja literature work 0-2. Grade 0 fail.

900027Y: Special Course in Finnish: Writing Skills, 3 op

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Proficiency level:

B1/B2, according to the Common European Framework.

Status:

The course is intended for the international students in every faculty of University of Oulu.

Required proficiency level:

A2.2 Completion of the Finnish for Advanced Students (900020Y) or the equivalent language skills.

ECTS Credits:

3 ECTS credits

Language of instruction:

Finnish

Timing:

-

Learning outcomes:

By the end of the course the student can write coherent and detailed descriptions and summaries about various matters. S/he is able to summarize text and justify his/her own statements of opinions. In addition, the student knows the steps of the writing process and understands the significance of a text's function and target audience. S/he can also differentiate between formal and informal writing styles.

Contents:

During the course students develop their writing skills in Finnish and are guided in the drafting of different text types and documents needed in studies and work. In the course students learn how to write informal and formal letters, an argument-essay, a summary, a job application and a report.

Mode of delivery:

One contact lesson at the beginning of the course and guided independent studying using online

Learning activities and teaching methods:

The course will be held online using an Optima environment.

Target group:

International degree and post-graduate degree students, exchange students and the staff members of the University

Prerequisites and co-requisites:

Completion of the Intermediate Finnish Course 2

Recommended optional programme components:

-

Recommended or required reading:

Web based material.

Assessment methods and criteria:

To pass the course, the student must complete all the required writing assignments.

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

Grading:

Grading is on a pass/fail basis.

Person responsible:

Anne Koskela

Working life cooperation:

-

Other information:

Sign-up in WebOodi or by emailing the contact teacher.

461102A: Statics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Mechanical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Lahtinen, Hannu Tapio

Opintokohteen kielet: Finnish

Leikkaavuudet:

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

461016A Statics 5.0 op

ECTS Credits:

5 ETCS / 149 hours of work

Language of instruction:

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

Timing:

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

Learning outcomes:

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

Contents:

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

Mode of delivery:

Implemented as Face-to-face -teaching.

Learning activities and teaching methods:

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

Target group:

Compulsory for candidate degree students of mechanical engineering programme.

Prerequisites and co-requisites:

Now prerequisites required.

Recommended optional programme components:

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

Recommended or required reading:

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

Assessment methods and criteria:

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

Grading:

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

Person responsible:

University teacher Hannu Lahtinen

Other information:

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

461103A: Strength of materials I, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Mechanical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Lahtinen, Hannu Tapio

Opintokohteen kielet: Finnish

Leikkaavuudet:

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

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

461010A Strength of Materials I 7.0 op

ECTS Credits:

5 ETCS / 149 hours of work

Language of instruction:

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

Timing:

The course is held in the spring semester, during periods 3 and 4. It is recommended to complete the course at the 1st spring semester.

Learning outcomes:

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

Contents:

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

Mode of delivery:

Implemented as Face-to-face -teaching.

Learning activities and teaching methods:

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

Target group:

Compulsory for Bachelor's degree students of mechanical engineering programme.

Prerequisites and co-requisites:

The recommended preceding course is 461102A Statics.

Recommended optional programme components:

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

Recommended or required reading:

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

Assessment methods and criteria:

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

Grading:

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

Person responsible:

University teacher Hannu Lahtinen

Other information:

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

900017Y: Survival Finnish, 2 op

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay900017Y Survival Finnish Course (OPEN UNI) 2.0 op

Proficiency level:

A1.1

Status:

The course is intended for the international students in every faculty of Oulu University.

Required proficiency level:

No previous Finnish studies.

ECTS Credits:

2 ECTS credits

Language of instruction:

Finnish and English

Timing:

-

Learning outcomes:

By the end of the course the student can understand and use some very common everyday expressions and phrases, and s/he can locate informational content in simple texts and messages. The student also knows the basic characteristics of Finnish language and Finnish communication styles.

Contents:

This is an introductory course which aims to help students to cope with the most common everyday situations in Finnish. During the course, students learn some useful everyday phrases, some general features of the vocabulary and grammar, and the main principles of pronunciation.

The topics and communicative situations covered in the course are: general information about the Finnish language, some politeness phrases (how to greet people, thank and apologize), introducing oneself, giving and asking for basic personal information, numbers, some time expressions (how to tell and ask the time, days of the week, time of day), food, drink and asking about prices.

The structures studied are: personal pronouns and their possessive forms, forming affirmative, negative and interrogative sentences, the conjugation of some verbs, the basics of the partitive singular and some local cases for answering the 'where'-question.

Mode of delivery:

Contact teaching, on-line learning and independent work. There will be organized also one on-line group in each semester.

Learning activities and teaching methods:

Lessons 2 times a week (26 h, including the final exam) and guided self study (24 h)

Target group:

International degree and post-graduate degree students and exchange students of the University

Prerequisites and co-requisites:

-

Recommended optional programme components:

-

Recommended or required reading:

Will be provided during the course.

Assessment methods and criteria:

Regular and active participation in the weekly lessons (twice a week), homework assignments and written exam at the end of the course will be observed in assessment.

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

Grading:

Grading scale is on a pass/fail basis.

Person responsible:

Anne Koskela

Working life cooperation:

-

Other information:

Sign-up in WebOodi.

461105A: Technical thermodynamics, 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Mechanical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Lahtinen, Hannu Tapio

Opintokohteen kielet: Finnish

Leikkaavuudet:

461035A Heat and Mass Transfer I 3.5 op

ECTS Credits:

5 ETCS / 120 hours of work

Language of instruction:

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

Timing:

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

Learning outcomes:

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

Contents:

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

Mode of delivery:

Implemented as Face-to-face -teaching.

Learning activities and teaching methods:

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

Target group:

Compulsory for candidate degree students of mechanical engineering programme.

Prerequisites and co-requisites:

Now prerequisites required.

Recommended optional programme components:

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

Recommended or required reading:

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

Assessment methods and criteria:

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

Grading:

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

Person responsible:

University teacher Hannu Lahtinen

Other information:

The course gives fundamental information of thermodynamics and its applications.