Opasraportti

Open University - Information and Communication Technologies (ICTs) (2021 - 2022)

Studying in the Open University

Open University offers courses in six fields of the faculties of the University of Oulu and the Language Centre of the University of Oulu. You may complete basic and intermediate studies as well as language and communication studies. The instruction is in line with the basic instruction offered to degree students at the University of Oulu in terms of quality, content, and learning outcomes. The Open University provides the chance to study regardless of your age or prior education.

To get the Open University study right you must register to the course/module and pay the tuition fees. Please note that study right may be longer than the time required to take the course. Informations about study right and time limitations can be found from WebOodi.

Completing entire degrees at the Open University is not possible. You may only complete parts of a degree that may later be included in your university degree if you are accepted into a university as a basic degree student.

The information about the courses, timetables and registration can be found from https://www.oulu.fi/joy/

For more information please contact avoin.yliopisto@oulu.fi

The Open University reserve the right to make changes.

Tutkintorakenteisiin kuulumattomat opintokokonaisuudet ja -jaksot

ay031010P: Calculus I (OPEN UNI), 5 op
ay031075P: Calculus II (OPEN UNI), 5 op
ay811102P: Devices and Data Networks (OPEN UNI), 5 op
ay031076P: Differential Equations (OPEN UNI), 5 op
ay521337A: Digital Filters (OPEN UNI), 5 op
ay521467A: Digital Image Processing (OPEN UNI), 5 op
ay812352A: Digitalisation and Innovation (OPEN UNI), 5 op
ay521141P: Elementary Programming (OPEN UNI), 5 op
ay811166P: Fundamentals to Information Systems (OPEN UNI), 5 op
ay521006P: Glimpse into ICT (OPEN UNIV), 2 op
ay811168P: Information Security (OPEN UNI), 5 op
ay812360A: Information Systems Modelling, Desing and Development (OPEN UNI), 5 op
ay521160P: Introduction to Artificial Intelligence (OPEN UNIV), 5 op
ay521287A: Introduction to Computer Systems (OPEN UNI), 5 op
ay521077P: Introduction to Electronics (OPEN UNI), 5 op
ay811174P: Introduction to Software Business (OPEN UNI), 5 op
ay811103P: Introduction to Software Engineering (OPEN UNI), 5 op
ay810136P: Introduction to information processing sciences (OPEN UNI), 5 op
ay031078P: Matrix Algebra (OPEN UNI), 5 op
ay521453A: Operating Systems (OPEN UNI), 5 op

ay521159P: Principles of Digital Fabrication (OPEN UNI), 5 op
ay811373A: Professional Software Engineering Processes and Human Factors (OPEN UNI, 5 op
ay811104P: Programming 1 (OPEN UNI), 5 op
ay811322A: Programming 2 (OPEN UNI), 5 op
ay811391A: Requirements Engineering (OPEN UNI), 5 op
ay812354A: Servitisation, Co-creation and Business Development (OPEN UNI), 5 op
ay811372A: Software Development, Maintenance and Operations (OPEN UNI), 5 op
ay521457A: Software Engineering (OPEN UNI), 5 op

Opintojaksojen kuvaukset

Tutkintorakenteisiin kuulumattomien opintokokonaisuuksien ja -jaksojen kuvaukset

ay031010P: Calculus I (OPEN UNI), 5 op

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: University of Oulu, Open University

Arvostelu: 1 - 5, pass, fail

Opetus suunnattu: University of Oulu, Open University

Opintokohteen kielet: Finnish

Leikkaavuudet:

   031010P   Calculus I   5.0 op

ECTS Credits:
5 ECTS credits / 135 hours of work
Language of instruction:
Finnish / The course can be completed in English by intermediate exams or by a final exam.
Timing:
Fall, period 1
Learning outcomes:
Upon completion of the course, the student
- knows how to solve inequalities and equations with absolute value
- identifies the concepts of vector algebra
- can use vector algebra for solving the problems of analytic geometry
- can explain basic characteristics of elementary functions
- is able to analyse the limit and the continuity of the real valued functions of one variable
- can analyse the local minima and maxima of a function
- knows how to find the derivative for a function given with parametric representation
- is able to evaluate the basic calculation of the complex numbers and can rewrite a complex number in its exponential form
- knows the connection between the integral and area
- knows integral techniques such as integration by parts, a substitution method and a partial fraction composition
- can solve problems associated with the differential and integral calculus of the real valued functions of one variable.

Contents:
- Inequalities and absolute value
- Vector algebra and analytic geometry
- Concept of the function and elementary functions
- Monotonicity of the function, the inverse function

- Limit values
- Derivative as limit value of the difference quotient. Derivatives of elementary functions
- The extreme values of a function
- Parameter presentation of the curve, polar coordinates, complex numbers
- Integral function and definite integral, applications
- Integration by parts, substitution method and integration of rational functions

Mode of delivery:
Blended learning, course material is in Moodle learning environment.
Learning activities and teaching methods:
Lectures 28 h / Group work 22 h / Self-study 85 h
Target group:
Open university students.
Recommended or required reading:
Grossmann, S.I.: Calculus of One Variable; Grossmann, S.I.: Multivariable Calculus, Linear Algebra and Differential Equations (partly); Adams, R.A.: A Complete Course Calculus (partly).
Assessment methods and criteria:
The course is completed with mid-term exams or a final exam. When completed with mid-term exams, exercise assignments are part of the continuous assessment. The assessment of the course is based on the learning outcomes of the course.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:
Pauliina Uusitalo

ay031075P: Calculus II (OPEN UNI), 5 op

Voimassaolo: 01.08.2016 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: University of Oulu, Open University

Arvostelu: 1 - 5, pass, fail

Opetus suunnattu: University of Oulu, Open University

Opintokohteen kielet: Finnish

Leikkaavuudet:

031075P	Calculus II	5.0 op

ECTS Credits:
5 ECTS credits / 135 hours of work
Language of instruction:
Finnish / The course can be completed in English by intermediate exams or by a final exam.
Timing:
Spring, period 3
Learning outcomes:
Upon completion of the course, the student
- is able to examine the convergence of series
- knows how use power series e.g. in calculating limits
- knows how to determine the Taylor polynomials for simple functions
- is able to find the extreme points of real valued function of two variables
- is able to solve problems related to differential and integral calculus of real and vector valued functions of several variables
- knows how to apply the polar-, cylidrical- and spherical coordinates in integration
Contents:
Sequences, series, power series and Fourier series of real terms. Differential and integral calculus of real and vector valued functions of several variables.
Mode of delivery:
Blended learning, course material is in Moodle learning environment
Learning activities and teaching methods:
Lectures 28 h / Group work 28 h / Self-study 85 h

Target group:
Open university students
Prerequisites and co-requisites:
The recommended prerequisite is the completion of the course ay031010P Calculus I.
Recommended or required reading:
Kreyszig, E: Advanced Engineering Mathematics; Grossman S.I.: Multivariable Calculus, Linear Algebra, and Differential Equations; Adams, R.A.: A Complete Course Calculus.
Assessment methods and criteria:
The course is completed with mid-term exams or a final exam. When completed with mid-term exams, exercise assignments are part of the continuous assessment. The assessment of the course is based on the learning outcomes of the course.
Read more about assessment criteria at the University of Oulu webpage.

Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.
Person responsible:
Pauliina Uusitalo

ay811102P: Devices and Data Networks (OPEN UNI), 5 op

Voimassaolo: 01.01.2019 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: University of Oulu, Open University

Arvostelu: 1 - 5, pass, fail

Opetus suunnattu: University of Oulu, Open University

Opettajat: Juustila, Antti Juhani

Opintokohteen kielet: Finnish

Leikkaavuudet:

811102P   Devices and Data Networks   5.0 op

ECTS Credits:
5 ECTS credits / 133 hours of work
Language of instruction:
The course has two parallel implementations: one in Finnish and one in English.
Timing:
The course is held in the autumn semester, during period 1.
Learning outcomes:
After completing the course, the student is able to:
- explain the basic structure and the development history of a microprocessor
- identify the core features of microprocessors (word size, clock frequency, power consumption, level of integration, RISC/CISC) and based on these, choose a suitable processor regarding the problem at hand
- describe the different representations of data (binary, hexadecial, octal) as well as data persistence and presentation formats within a computer as well as in data transmission through networks
- describe the most important peripheral devices, data buses and interfaces (memory, I/O, USB, I2C, SPI)
- explain the principles of using stack and heap memories from the programmer's perspective
- explain the central properties and history of internet and important internet protocols (such as TCP, UDP, HTTP, TLS/SSL, XMPP, DHCP) as well as the layered architecture of protocols
- describe the implications of data networks, such as delays, packet loss and capacity, and understand the effects of these on developing services and applications relying on networks
- explain the particular features of wireless networks
- identify the basic techniques of utilizing networks when developing services and applications, using some programming language

Contents:
Basic structure and development history of microprocessors. Core features of microprocessors (word size, clock frequency, power consumption, level of integration, RISC/CISC). Different representations of data (binary, hexadecial, octal), data persistence and presentation formats in computers and networks. Peripheral devices,

data buses and interfaces (memory, I/O, USB, I2C, SPI). Stack and heap memories. Properties and history of internet and internet protocols, layered architecture of protocols. Impact of data network properties on developing services and applications. Wireless networks. Programming networked applications and services.
Mode of delivery:
Blended teaching, Moodle, videos.
Learning activities and teaching methods:
Lectures, (20 h), independent studying (30 h), exercises (20 h), demonstrations (20 h), essay (20 h), other active teaching methods and group work (20 h).
Target group:
Open university students.
Recommended optional programme components:

Recommended or required reading:
Lecture material, demonstrations, exercise material and other material and literature announced in the course.
Assessment methods and criteria:
Exam (in learning environment), personal portfolio, essay, continuous evaluation.
Grading:
Numerical scale 1-5 or fail
Person responsible:
Antti Juustila

ay031076P: Differential Equations (OPEN UNI), 5 op

Voimassaolo: 01.06.2018 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: University of Oulu, Open University

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

031076P   Differential Equations   5.0 op

ECTS Credits:
5 ECTS credits / 135 hours of work
Language of instruction:
Finnish
Timing:
The course is held in the spring, during period 4.
Learning outcomes:
The students can apply differential equations as a mathematical model. They can identify and solve various differential equations and they have knowledge on basic solvability of differential equations. The student can use the Laplace transform as a solution method.
Contents:
First order differential equations and their solution methods. Linear differential equations of higher order. Laplace transform and its use forsolving differential equations. Systems of differential equations of first order.
Mode of delivery:
Blended teaching. The course material is in the Moodle learning environment
Target group:
Open university students
Prerequisites and co-requisites:
Calculus I and II
Recommended or required reading:
Kreyszig, E: Advanced Engineering Mathematics
Assessment methods and criteria:

Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail
Person responsible:
Keijo Ruotsalainen

ay521337A: Digital Filters (OPEN UNI), 5 op

Voimassaolo: 01.01.2021 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: University of Oulu, Open University

Arvostelu: 1 - 5, pass, fail

Opetus suunnattu: University of Oulu, Open University

Opintokohteen kielet: Finnish

Leikkaavuudet:

521337A Digital Filters 5.0 op

ECTS Credits:
5 ECTS cr
Language of instruction:
Finnish / English
Timing:
Spring, period 3.
Learning outcomes:
1. Student is able to specify and design respective frequency selective FIR and IIR filters using the most common methods.

2. Student is able to solve for the impulse and frequency responses of FIR and IIR filters given as difference equations, transfer functions, or realization diagrams, and can present analyses of the aliasing and imaging effects based on the responses of the f

3. Student is able to explain the impacts of finite word length in filter design.

4. Student has the necessary basic skills to use signal processing tools available in Matlab environment and to judge the results.
Contents:
1. Sampling theorem, aliasing and imaging, 2. Discrete Fourier transform, 3. Z-transform and frequency response, 4. Correlation and convolution, 5. Digital filter design, 6. FIR filter design and realizations, 7. IIR filter design and realizations, 8. Finite word length effects and analysis, 9. Multi-rate signal processing.
Mode of delivery:
Online teaching/contact teaching
Learning activities and teaching methods:
Online lectures and exercises 50 h. The design exercises familiarize the students with the methods of digital signal processing using the Matlab software package. The rest as independent work.
Target group:
Computer Science and Engineering students and other Students of the University of Oulu.
Prerequisites and co-requisites:
031077P Complex Analysis, 031080A Signal Analysis
Recommended optional programme components:
The course is an independent entity and does not require additional studies carried out at the same time.
Recommended or required reading:
Lecture notes and exercise materials. Material is in Finnish and in English. Course book: Ifeachor, E., Jervis, B.: Digital Signal Processing, A Practical Approach, Second Edition, Prentice Hall, 2002.
Assessment methods and criteria:
The course can be passed either with week exams or a final exam. In addition, the exercises need to be returned and accepted.
Read more about [assessment criteria](#) at the University of Oulu webpage.
Grading:
The course unit utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.
Person responsible:
Olli Silvén
Other information:

ay521467A: Digital Image Processing (OPEN UNI), 5 op

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: University of Oulu, Open University

Arvostelu: 1 - 5, pass, fail

Opetus suunnattu: University of Oulu, Open University

Opintokohteen kielet: Finnish

Leikkaavuudet:

521467A   Digital Image Processing   5.0 op

ECTS Credits:
5 ECTS credits / 133 hours of work
Language of instruction:
Finnish / English
Timing:
Spring, period 4.
Learning outcomes:
Upon completion of the course the student:
- understands the basic theory of digital image processing and knows its main applications,
- is able to apply spatial and frequency domain and wavelet based methods in image enhancement, restoration, compression and segmentation.
Contents:
1. Introduction
2. Fundamentals of digital image
3. Intensity transformations and spatial filtering
4. Image processing in frequency domain
5. Restoration
6. Color image processing
7. Wavelets and multi-scale processing
8. Compression
9. Morphological image processing
10. Segmentation
Mode of delivery:
Face-to-face teaching.
Learning activities and teaching methods:
Lectures 24 h, exercises 14 h and homework assignments 30 h. The rest is independent work.
Target group:
Students of the University of Oulu and open university and other Students of the University of Oulu.
Prerequisites and co-requisites:
521141P Elementary Programming or equivalent Python programming skills.
Recommended or required reading:
Gonzalez, R.C., Woods, R.E.: Digital Image Processing, Third Edition, Prentice-Hall, 2008, Chapters 1-10.
Lecture notes and exercise
Assessment methods and criteria:
The course is completed by passing the exam and homework assignments.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
The course unit utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.
Person responsible:
Janne Heikkilä
Other information:

ay812352A: Digitalisation and Innovation (OPEN UNI), 5 op

Voimassaolo: 01.01.2020 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: University of Oulu, Open University

Arvostelu: 1 - 5, pass, fail

Opettajat: Oinas-Kukkonen, Harri Ilmari

Opintokohteen kielet: English

Leikkaavuudet:

812352A   Digitalisation and Innovation   5.0 op

ECTS Credits:
5 ECTS credits / 133 hours of work
Language of instruction:
The language of instruction of the course is English.
Timing:
The course is held in the autumn semester, during period 1.
Learning outcomes:
After completing the course, the student will be able to:
- identify and describe what is digitalisation and why it is happening,
- describe how information systems and digitalisation are connected,
- build an overview of organisational/enterprise information systems,
- describe the role of emerging technologies in the society,
- form an overview and describe how innovation takes place, particularly in IT, as well as
- identify opportunities and challenges of future technologies.

Contents:
1. What is digitalisation? What is digital transformation? Why digitalisation?
2. Information systems and digitalisation
3. Organisational information systems
4. The role of emerging technologies
5. The quest for disruptive Zero-to-One innovation
6. Core business values
7. Innovation strategies and innovation ecosystems
8. Opportunities and challenges of future technology

Mode of delivery:
Online teaching (recoreded materials, course literature)
Learning activities and teaching methods:
E-materials, independent work, course tasks and an essay.
Target group:
Open university students.
Prerequisites and co-requisites:
The required prerequisite is that the student has completed BSc degree as well as has basic knowledge on
Information Systems.
Assessment methods and criteria:
Course essay
Grading:
Numerical scale 1-5 or fail
Person responsible:
Piiastiina Tikka
Other information:
This course is provided fully online, with final essay deadlines three times per year (autumn, spring, summer).

ay521141P: Elementary Programming (OPEN UNI), 5 op

Voimassaolo: 01.01.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: University of Oulu, Open University

Arvostelu: 1 - 5, pass, fail

Opetus suunnattu: University of Oulu, Open University

Opettajat: Mika Oja

Opintokohteen kielet: Finnish

Leikkaavuudet:

521141P   Elementary Programming   5.0 op

Voidaan suorittaa useasti: Kyllä

ECTS Credits:
5
Language of instruction:
Finnish / English
Learning outcomes:
1. Is capable of solving problems in the computer's terms
2. Understands the basic concepts of programming
3. Knows the basics of the Python programming language
4. Is able to implement programs independently
5. Is able to use the internet to find information about programming

Contents:
Basic concepts of programming, basic structures of programming languages, solving problems by programming.
Mode of delivery:
Web-based teaching
Learning activities and teaching methods:
Learning assignments in a web environment.
Target group:
Open university students
Recommended optional programme components:
The course provides a basis for subsequent programming courses.
Assessment methods and criteria:
The course is completed by passing all learning assignments, programming exercises and a final exercise project.
Read more about [assessment criteria](#) at the University of Oulu webpage.
Grading:
Pass/fail
Person responsible:
Mika Oja
Other information:
The course learning platform is Lovelace (lovelace.oulu.fi).

ay811166P: Fundamentals to Information Systems (OPEN UNI), 5 op

Voimassaolo: 01.08.2020 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: University of Oulu, Open University

Arvostelu: 1 - 5, pass, fail

Opetus suunnattu: University of Oulu, Open University

Opettajat: Pasi Karppinen

Opintokohteen kielet: Finnish

Leikkaavuudet:

811166P   Fundamentals to Information Systems   5.0 op

ECTS Credits:
5 ECTS credits / 133 hours of work
Language of instruction:
The language of instruction of the course is Finnish.
Timing:

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

Learning outcomes:

After completing the course, the student will be able to:
- use basic concepts of information systems,
- recognize challenges regarding the use of information systems and users,
- describe the basics of organisation, e.g. its structure and function,
- recognize different types of information systems and their roles in an organisation,
- describe how organizational knowledge is formed and recognizes challenges of managing it,
- recognize ethical and social challenges related to information systems,
- describe the role of information systems in leadership and decision making,
- recognize the possibilities of information systems renewal and financial impact of it, as well as
- describe the basics of the history of information systems discipline, its research methods and scientific journals.

Contents:
- Basic terms and concepts of information systems.
- Challenges regarding the use of information systems and its users.
- Basics of organisation.
- Types of information systems and their roles in an organisation.
- How knowledge is formed in organizations.
- Ethical and social challenges related to information systems.
- Information systems in decision making process.
- Possibilities of information systems renewal and financial impact of it.
- The history of information systems discipline, its research methods and scientific journals.

Mode of delivery:

Blended teaching

Learning activities and teaching methods:

Familiarizing lecture material, independent study of the course literature, weekly tasks and scientific essay. Total 133h

Target group:

Open university students.

Recommended or required reading:

Lecture materials and Laudon, K. C. & Laudon, J. P. (2020). Management information systems: Managing the digital firm (Sixtteenth edition, global edition.). Harlow, England: Pearson.

Assessment methods and criteria:

Active participation in lectures or online environment. Weekly tasks and scientific essay.

Grading:

Numerical scale 1-5 or fail

Person responsible:

Pasi Karppinen

Working life cooperation:

Possibly visiting lecturers from companies and other organizations

ay521006P: Glimpse into ICT (OPEN UNIV), 2 op

Voimassaolo: 01.01.2020 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: University of Oulu, Open University

Arvostelu: 1 - 5, pass, fail

Opetus suunnattu: University of Oulu, Open University

Opettajat: Antti Mäntyniemi, Fanny Vainionpää

Opintokohteen kielet: Finnish

Leikkaavuudet:

521006P   Glimpse into ICT   2.0 op

ay811168P: Information Security (OPEN UNI), 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: University of Oulu, Open University

Arvostelu: 1 - 5, pass, fail

Opetus suunnattu: University of Oulu, Open University

Opintokohteen kielet: Finnish

Leikkaavuudet:

811168P   Information Security   5.0 op

ECTS Credits:
5 ECTS credits/133 hours of work
Language of instruction:
The language of instruction of the course is Finnish.
Timing:
The course is held in the spring semester, during period 3.
Learning outcomes:
After completing the course, the student will be able able to:
- define essential information security concepts and components of information systems security,
- recognize the common types of security threats, and their managerial and technical protection mechanisms,
- describe the tasks and responsibilities of information security professionals,
- explain the different phases of secure systems development/acquisition,
- recognize the fundamental characteristics of risk management and evaluate information security risks,
- recognize basics of technical information security methods and cryptography, as well as
- explain areas of behavioral information security research and their practical implications.
Contents:
- Basic concepts of information security
- Information security threats, vulnerabilities, and risks
- Legal issues and information security frameworks
- Risk management
- Cryptography
- Information security technologies
- Behavioral information security research
Mode of delivery:
Blended teaching
Learning activities and teaching methods:
Lectures and related quizzes or final exam 26 h, weekly assignments and scientific essay 107 h
Target group:
Open university students.
Prerequisites and co-requisites:
The required prerequisite is that the learning outcomes of the following courses are accomplished: Introduction to Information Processing Science as well as Devices and Data Network
Recommended optional programme components:

Recommended or required reading:
Lecture materials, selected articles, and book: Whitman & Mattord (2015). Principles of information security.
Assessment methods and criteria:
Weekly assignments. Group or individual assignment.
Grading:
Numerical scale 1-5 or fail
Person responsible:
Elina Annanperä

ay812360A: Information Systems Modelling, Desing and Development (OPEN UNI), 5 op

Voimassaolo: 01.01.2021 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: University of Oulu, Open University

Arvostelu: 1 - 5, pass, fail

Opetus suunnattu: University of Oulu, Open University

Opintokohteen kielet: Finnish

Leikkaavuudet:

812360A   Information Systems Modelling, Desing and Development   5.0 op

ECTS Credits:
5 ECTS credits / 133 hours of work
Language of instruction:
The language of instruction of the course is Finnish.
Timing:
The course is held in the spring semester, during period 4.
Learning outcomes:
After completing the course, the student will be able to:
- describe the basics of modelling,
- describe the importance of modelling when designing information systems,
- use different kinds of modelling types to represent and design information systems from different points of view,
- use modelling in definition phase of information system design,
- recognize and model stakeholder groups for information system design,
- recognize and model use cases for information system design,
- use modelling in the final parts of the information system design,
- describe the connections between design, modelling and implementation,
- use prototyping and modelling as communication method towards stakeholders, as part of requirement specification and as part of evaluating design concepts, as well as
- recognizes the ethical issues in information system desing and the designer responsibility.
Contents:
- Basics of modelling
- Importance of modelling when designing information systems
- Modelling types to represent and design informationsystems from different points of view
- Modelling in definition phase of information system design
- Modelling stakeholder groupsfor information system design
- Modelling use cases for information system design
- Modelling in the final parts of the informationsystem design
- Connections between design, modelling and implementation
- Prototyping and modelling as communication method towards stakeholders, as part of requirement specification and as part of evaluating design concepts
- Ethical issues in information system desing and the designer responsibility.
Mode of delivery:
Online teaching
Learning activities and teaching methods:
Online lectures 27h, online tasks 24h, independent assignment 85h.
Target group:
Open university students.
Prerequisites and co-requisites:
The required prerequisite is that the learning outcomes of the following courses and their predecessors are accomplished: Fundamentals of Information Systems.
Recommended or required reading:
Satzinger, Jackson ja Burd (2007), Systems Analysis and Design in a Changing World. Hoffer, George and Valacich (2008), Modern systems Analysis and Design, 5. edition
Assessment methods and criteria:
Online tasks assignment
Grading:
Numerical scale 1-5 or fail
Person responsible:
Mikko Rajanen
Working life cooperation:
Possibly visiting lecturers from companies and other organizations

ay521160P: Introduction to Artificial Intelligence (OPEN UNIV), 5 op

Voimassaolo: 01.01.2020 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: University of Oulu, Open University

Arvostelu: 1 - 5, pass, fail

Opetus suunnattu: University of Oulu, Open University

Opettajat: Riku Hietaniemi

Opintokohteen kielet: English

Leikkaavuudet:

   521160P   Introduction to Artificial Intelligence   5.0 op

Language of instruction:
Finnish / English
Mode of delivery:
The compulsory weekly exams for the course are organised in Moodle automatically on a scheduled basis. They must be completed according to the schedule presented at the beginning of the course on a specific day within a specific time window. Otherwise, in the independent completion of the course, it is possible to adapt the studies flexibly according to your own schedule.
Target group:
Open university students
Person responsible:
Riku Hietaniemi

ay521287A: Introduction to Computer Systems (OPEN UNI), 5 op

Voimassaolo: 01.08.2016 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: University of Oulu, Open University

Arvostelu: 1 - 5, pass, fail

Opetus suunnattu: University of Oulu, Open University

Opintokohteen kielet: Finnish

Leikkaavuudet:

   521287A   Introduction to Computer Systems   5.0 op

ECTS Credits:
5
Language of instruction:
Finnish / English
Timing:
Autumn, periods 1-2.
Learning outcomes:
Upon completing the course, the student understands the basics of computer architecture and CPU operation.
Student knows number systems and data representations in computer.
Student is familiar of I/O operation with peripheral devices.
Student is able to implement small programs with the C programming language for workstations and embedded systems.
Student recognizes how embedded systems programming is different from programming general-purpose computers.
Contents:
Overview of computer architecture and CPU, data types and memory management, interrupts, registers and I/O, general computer and embedded systems programming, basics of the C programming language.
Mode of delivery:
Web-based teaching and face-to-face teaching, if applicable.
Learning activities and teaching methods:
Lectures (20h), course exercises (10-20h), laboratory exercise (3h) and course project in a group.
Target group:

Open university students.
Prerequisites and co-requisites:
Elementary programming 521141P or equivalent programming skills.
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 and exercise material are available in the course website.
For English speaking students, either of the following material may be useful:
Patterson & Hennessy, Computer Organization and Design: The Hardware/Software Interface, 5th Edition, Chapter 1.
Bryant & O'Hallaron, Computer Systems: A Programmer's Perspective, 3rd Edition, Chapter 1.
Patterson & Hennessy, Computer Organization and Design, 5th Edition: The Hardware/Software Interface, 2014.
Bryant & O'Hallaron, Computer Systems: A Programmer's Perspective, 2016.

Assessment methods and criteria:
The assessment criteria is based on the learning outcomes of the course. Students complete the course exercises, participate to the laboratory exercise and complete the course project in a group. Assessment is based on the exercises and the course project. More detailed information on assessment is published in the lecture material.
Grading:
Numerical grading scale 1-5, zero stands for fail.
Person responsible:
Teemu Leppänen
Working life cooperation:
Visiting lectures with experts from local industry are possible.
Other information:
The course learning platform is Lovelace (lovelace.oulu.fi).
This course replaces the course 521142A Embedded systems programming.

ay521077P: Introduction to Electronics (OPEN UNI), 5 op

Voimassaolo: 01.08.2015 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: University of Oulu, Open University

Arvostelu: 1 - 5, pass, fail

Opetus suunnattu: University of Oulu, Open University

Opettajat: Jari Hannu

Opintokohteen kielet: Finnish

Leikkaavuudet:

521077P   Introduction to Electronics   5.0 op

ECTS Credits:
5 ECTS credits / 132,5 hours of work
Language of instruction:
Finnish
Timing:
The course is held in the 1st period. It is recommended to complete the course at the 1st autumn semester.
Learning outcomes:
1. Student understands the block structures of electronic devices and their signal processing paths.

2. Student can identify the interfaces of analog and digital electronics and the software operations.

3. Student is able to identify and classify electronics components and compare their properties.

4. Students can describe electric conductivity and apply the phenomenon on designing and choosing resistors

5. Student is able to estimate the difference between dielectric materials and how they affect the properties of a capacitor.

6. Student can compare properties of magnetic materials and how identify they effect on inductive components.

7. Student can identify semiconductivity and is able to list typical semiconductor components.

8. Student can classify different circuit board techniques and is able to choose proper coupling techniques.

9. Student can identify the future technologies of electronics materials.

Contents:

Structures and interfaces of electronic devices. Electromagnetic properties of materials (conductivity, dielectricity, magnetism and semiconductivity).Electronics components (resistors, capacitors, inductive components and semiconductors). Interconnection technologies and circuit board technologies. The future of electronic materials and application areas.

Mode of delivery:

Face-to-face teaching and independent work.

Learning activities and teaching methods:

The implementation methods of the course vary. The course will be arranged utilizing activating teaching methods agreed on together with the students. There will be 48 hours of guided teaching events and 84.5 hours of teaching without guidance either privately or in a group.

Target group:

Open university students and other students of University of Oulu, first year Electronics and communications engineering students.

Prerequisites and co-requisites:

No prerequisites.

Recommended or required reading:

Lecture material; Materials science and engineering: an introduction / Willam D. Callister, chapters 1, 18 and 20; Electronic components and technology / S. J. Sangwine. Chapters 1,2,3,5 and 7

Assessment methods and criteria:

This course utilizes continuous assessment. During the course, there are two intermediate exams. In addition students will make course work which are graded. The assessment of the course is based on the learning outcomes of the course. Read more about assessment criteria at the University of Oulu webpage.

Grading:

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

Person responsible:

Jari Hannu

ay811174P: Introduction to Software Business (OPEN UNI), 5 op

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: University of Oulu, Open University

Arvostelu: 1 - 5, pass, fail

Opetus suunnattu: University of Oulu, Open University

Opintokohteen kielet: Finnish

Leikkaavuudet:

811174P   Introduction to Software Business   5.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work.

Language of instruction:

The language of instruction of the course is Finnish.

Timing:

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

Learning outcomes:

After completing the course, a student will be able to:

- explain how the industry is structured
- describe the software industry's business logic as typically used in business models and the reasoning behind their use
- describe the important areas of the software business as well as

- describe legal issues realted to software business.

Contents:
This course provides an overview of software business from three different viewpoints: software industry, business logic, and functions of a software company.
Mode of delivery:
Blended teaching
Learning activities and teaching methods:
Familiarising with lecture material, weekly exercises, total 133 h
Target group:
Open university students.
Prerequisites and co-requisites:
The required prerequisite is that the learning outcomes of the following courses are accomplished: Introduction to Information Processing Science
Recommended or required reading:
Course material and related literature.
Assessment methods and criteria:
Weekly assignments.
Grading:
Numerical scale 1-5 or fail.
Person responsible:
Marianne Kinnula

ay811103P: Introduction to Software Engineering (OPEN UNI), 5 op

Voimassaolo: 01.08.2019 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: University of Oulu, Open University

Arvostelu: 1 - 5, pass, fail

Opettajat: Oivo, Markku Tapani

Opintokohteen kielet: Finnish

Leikkaavuudet:

811103P   Introduction to Software Engineering   5.0 op

ECTS Credits:
5 ECTS credits / 133 hours of work
Language of instruction:
The course has two parallel implementations: one in Finnish and one in English.
Timing:
The course is held in the autumn semester, during period 2.
Learning outcomes:
After completing the course, the student will be able to:
- describe the principles, define the key concepts and use professional terminology of software engineering,
- describe software engineering as a professional practice and a field of industry,
- describe and work following professional practices that are important for software engineers,
- describe contemporary software processes and choose appropriate ones for specific situations,
- describe and apply valid problem identification and structuring methods in software engineering,
- identify and apply some contemporary software engineering models, methods and tools, as well as
- describe the necessity of continuing learning and professional development
Contents:
- Principles of professional software development
- Software processes
- Agile software development
- Requirements engineering
- System modelling
- Architectural design
- Design and implementation
- Software testing
- Software evolution
Mode of delivery:

Blended teaching
Learning activities and teaching methods:
Zoom lectures that will be recorded, group exercises, independent work, total 133h
Target group:
Open university students.
Prerequisites and co-requisites:
The required prerequisite is that the learning outcomes of the following courses are accomplished: Introduction to Information Processing Science
Recommended or required reading:
All material in Moodle. Recommend book Sommerville, Ian (2016). Software Engineering, 10th Edition.
Assessment methods and criteria:
Moodle assignments and group work. Group work can be completed remotely and also replaced by an essay. Assessment is based on Moodle assignments and essays. Fully online participation is possible.
Grading:
Numerical scale 1-5 or fail
Person responsible:
Markku Oivo
Working life cooperation:
Guest lectures and /or company visits

ay810136P: Introduction to information processing sciences (OPEN UNI), 5 op

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: University of Oulu, Open University

Arvostelu: 1 - 5, pass, fail

Opetus suunnattu: University of Oulu, Open University

Opintokohteen kielet: Finnish

Leikkaavuudet:

810136P   Introduction to Information Processing Sciences   5.0 op

ECTS Credits:
5 ECTS credits / 133 hours of work.
Language of instruction:
The language of instruction of the course is Finnish.
Timing:
The course is held in the autumn semester, during period 1. It is recommended to complete the course at the 1st autumn semester. Another implementation, targeted especially for Open University and minor students, is held in the spring semester, during period 4.
Learning outcomes:
After passing the course, a student will be able to
- describe the disciplines of Information Processing Science,
- explain the essential Information Processing Science concepts,
- name historically significant and current research topics in Information Processing Science,
- identify the characteristics and requirements of work tasks in the field of Information Processing,
- describe the priciples of responsible conduct of research and professional ethics in Information Processing Science
- retrieve, analyse, contest and classify information related to those, as well as
- discuss and report in written form on those using one reference convention of the scientific discipline.

Contents:
The course consists of lectures on disciplines, essential concepts, historically significant and current research as well practical work life in Information Processing Science. In addition, the student will familiarize with scientific work skills by listening, reading, thinking critically and creatively, retrieving data, classifying, reflecting and presenting in written form.

Mode of delivery:
Distance or blended teaching: the course is organised mainly in Moodle.
Learning activities and teaching methods:
Lecture videos and related assignments as well as essays and other task, total 133 h.

Target group:
Open university students.
Recommended optional programme components:

Recommended or required reading:
Digital study material, material searched by students themselves.
Assessment methods and criteria:
Exercise tasks.

Grading:
Numerical scale 1-5 or fail.
Person responsible:
Henrik Hedberg

ay031078P: Matrix Algebra (OPEN UNI), 5 op

Voimassaolo: 01.08.2016 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: University of Oulu, Open University

Arvostelu: 1 - 5, pass, fail

Opetus suunnattu: University of Oulu, Open University

Opintokohteen kielet: Finnish

Leikkaavuudet:

   031078P   Matrix Algebra   5.0 op

ECTS Credits:
5 ECTS credits / 135 hours of work
Language of instruction:
Finnish and English
Timing:
The course is held in the autumn, during period 2.
Learning outcomes:
The student is able to apply arithmetic operations of matrices and can solve system of linear equations by matrix methods and can apply matrix factorizations to find the solution of the system of linear equations.
The student is able to recognize the vector space and understands the concepts of basis and dimension of a vector space and can analyse matrices by the parameters, vectors and vector spaces of matrices. He/She knows how to calculate determinant, eigenvalues and eigenvectors of a square matrix, and is able to diagonalize matrices and apply diagonalization to the simple problems.
Contents:
1. Vectors and matrices 2. Systems of linear equations. 3. Matrix factorizations. 4. Vector spaces. 5. The rank, nullity, row space and the column space of a matrix. 6. The determinant of a matrix. 7. Eigenvalues and eigenvectors of a matrix. 8. The diagonalization with applications.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 28 h / Group work 22 h / Self-study 85 h.
Target group:
Open university students.
Recommended or required reading:
Recommented literature: Grossman, S.I: Elementary Linear Algebra; David C. Lay: Linear Algebra and Its Applications.
Assessment methods and criteria:
The course can be completed by intermediate exams (2 exams) or by a final exam.
Read more about [assessment criteria](#) at the University of Oulu webpage.
Grading:
The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail
Person responsible:
Matti Peltola

ay521453A: Operating Systems (OPEN UNI), 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: University of Oulu, Open University

Arvostelu: 1 - 5, pass, fail

Opetus suunnattu: University of Oulu, Open University

Opettajat: Juha Röning

Opintokohteen kielet: Finnish

Leikkaavuudet:

521453A   Operating Systems   5.0 op

ECTS Credits:
5
Language of instruction:
Finnish / English
Timing:
Spring, period 4
Learning outcomes:
1. is capable of explaining the basic structure and functioning of operating system
2. is able to point the problems related to process management and synchronization as well as is able to apply learned methods to solve basic problems
3. is capable of explaining the cause and effect related to deadlocks and is able to analyse them related to common circumstances in operating systems
4. is able to explain the basics of memory management, the use of virtual memory in modern operating systems as well as the structure of the most common file-systems.

Contents:
Operating system structure and services, process management, process synchronization, deadlocks, memory management, virtual memory, file-systems
Mode of delivery:
Face-to-face.
Learning activities and teaching methods:
Lectures 36 h, laboratory exercise 4 h, the rest as independent work. The laboratory work, including pre-exercise and guided exercise performed in a group of one or two students in the unix environment, covers core topics of the course.
Target group:
Open university students
Prerequisites and co-requisites:
521141P Elementary Programming, 521286A Computer Systems or 521142A Embedded Systems Programming and 521267A Computer 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 (in Finnish) and exercise material. Silberschatz A., Galvin P., and Gagne G.: Operating System Concepts, 6th edition (or newer), John Wiley & Sons, Inc., 2003. Chapters 1-12.
Assessment methods and criteria:
The course is passed the final examination and accepted laboratory working.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
The course unit utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.
Person responsible:
Juha Röning

ay521159P: Principles of Digital Fabrication (OPEN UNI), 5 op

Voimassaolo: 01.01.2021 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: University of Oulu, Open University

Arvostelu: 1 - 5, pass, fail

Opetus suunnattu: University of Oulu, Open University

Opintokohteen kielet: Finnish

Leikkaavuudet:

521159P   Principles of Digital Fabrication   5.0 op

ECTS Credits:
5 ECTS credits/ 135 hours of work
Language of instruction:
Finnish/English
Timing:
The course will be held in the spring semester, during period IV.

Learning outcomes:
In this course the students will learn the whole process of digital fabrication typically available in FabLab. They will learn how to create an interactive 3D prototype, design mechanical parts for prototype, create basic electronics, implement a control logic for open hardware embedded board, and work in teams on project.
Contents:
The course teaches students to (1) design mechanical components with solid modeling tools, (2) build necessary electronics, and (3) implement software to a microcontroller, to create typically in FabLab a physical gadget that interacts with the world around it.
Mode of delivery:
Online Lectures and TA sessions (alternatively, in FabLab if situation permits). Individual work towards project.
Learning activities and teaching methods:
Lectures 30h / Individual work 123h. There are sessions each week online where guidance is available (min total 16 h).
Target group:
Open university students.
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:
There is no recommended or required reading. The tutorials for tools and software (or links to such tutorials) will be provided in the course.
Assessment methods and criteria:
The course will be evaluated on the basis of the project delivered by the teams of students. Essential part of this reporting is the documentation of the project.
Grading:
pass/fail
Person responsible:
Georgi Georgiev
Other information:
The course d gives 5 ECTS credits that can be included in some bachelor's degrees at University of Oulu.
Course work space can be found from University of Oulu Moodle platform moodle.oulu.fi

ay811373A: Professional Software Engineering Processes and Human Factors (OPEN UNI, 5 op

Voimassaolo: 01.08.2019 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: University of Oulu, Open University

Arvostelu: 1 - 5, pass, fail

Opetus suunnattu: University of Oulu, Open University

Opettajat: Minna Isomursu

Opintokohteen kielet: English

Leikkaavuudet:

811373A   Professional Software Engineering Processes and Human Factors   5.0 op

815662S   Software Engineering Management, Measurement and Improvement   5.0 op

ECTS Credits:
5 ECTS credits / 133 hours of work
Language of instruction:
The language of instruction of the course is English.
Timing:
The course is held in the autumn semester, during period 2.
Learning outcomes:
After completing the course the student will be able to:
- recognize and describe software development processes models,
- evaluate and compare their applicability in different contexts,
- take human factors into account in planning and operating in professional software development,
- analyze their own strengths and improvement areas as software engineers to see opportunities for development, as well as
- participate in systematic efforts for improvement in software development organizations.
Contents:
Module 1: Software development process models. Theory and cases.
Module 2: Human factors in software development. Recognizing individual and team characteristics, and cultivating personal awareness and developement pathways
Module 3: Software process improvement. Theory and cases.
Mode of delivery:
Blended teaching, Moodle, videos.
Learning activities and teaching methods:
Introduction lecture, assignments, lectures of visiting professionals, group work and presentations
Target group:
Open university students.
Prerequisites and co-requisites:
The required prerequisite is that the learning outcomes of the following courses and their predecessors are accomplished: Software Development, Maintenance and Operations.
Recommended or required reading:
Provided in Moodle.
Assessment methods and criteria:
Completing individual assignments, group work, active participation in peer feedback
Grading:
Numerical scale 1-5 or fail
Person responsible:
Minna Isomursu
Working life cooperation:
Visiting lectures of experienced software professionals

ay811104P: Programming 1 (OPEN UNI), 5 op

Voimassaolo: 01.08.2019 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: University of Oulu, Open University

Arvostelu: 1 - 5, pass, fail

Opettajat: Ilkka Räsänen

Opintokohteen kielet: Finnish

Leikkaavuudet:

811104P   Programming 1   5.0 op

ECTS Credits:
5 ECTS credits / 133 hours of work
Language of instruction:
The language of instruction of the course is Finnish.
Timing:
The course is held in the autumn semester, during periods 1 and 2.
Learning outcomes:

After completion of this course, the student is able to:

- Create simple working programs
- Identify basic control structures and use them in the program
- Identify the concepts of modularity, table, storage of information, and use them in the program
- Find and fix errors in the program
- Solve a computational problem by using abstraction and stepwise refinement
- Explain the concept of recursion
- Operate with binary and hexadecimal number systems, as well as knows the presentation of numbers on a computer
- Document the program

Contents:

1. Software design method (waterfall) 2. Problem solving 3. Stepwise refinement 4. Control structures 5. Modular programming, calling modules, communication between modules 6. Data types 7. Arrays 8. Pointers 9. Character strings 10. Data structures 11. Storing data.

Mode of delivery:

Blended teaching: lecture videos, Moodle-environment, Zoom-exercises or computer lab exercises, according to own preference.

Learning activities and teaching methods:

Theory studies at lectures and/or online (in Finnish) 40h, programming exercises in a computer lab and/or an online learning environment 24h, self-study 70h

Target group:

Open university students.

Recommended or required reading:

Recommended reading for example: Deitel, Deitel: C HOW TO PROGRAM; Pearson Education Inc. 2007, or a newer edition. Lecture slides.

Assessment methods and criteria:

1. Final exam and exercise points and programming assignment. OR 2. Mid-term exams (2) and exercise points and home programming assignment.

Grading:

Numerical scale 1-5 or fail

Person responsible:

Jouni Lappalainen

ay811322A: Programming 2 (OPEN UNI), 5 op

Voimassaolo: 01.01.2021 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: University of Oulu, Open University

Arvostelu: 1 - 5, pass, fail

Opetus suunnattu: University of Oulu, Open University

Opintokohteen kielet: Finnish

Leikkaavuudet:

  811322A   Programming 2   5.0 op

ECTS Credits:

5 ECTS credits / 133 hours of work

Language of instruction:

The course has two parallel implementations: one in Finnish and one in English.

Timing:

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

Learning outcomes:

After completion of this course, the student will be able to:

- describe the principles of object paradigm (encapsulation, polymorphism, inheritance, composition), generics, and design patterns and is able to utilise these concepts when creating software,
- describe exception and error management and create fault tolerant programs,
- explain the connection between the UML models and the source code,
- test an application and interpret the structure and functionality of the source code, as well as
- use basic programming tools (such as compilter/an IDE) and is aware of the purpose of a version control system and code analysis tools.

Contents:
The concept of an object, encapsulation, composition, inheritance, polymorphism, exceptions, UML charts and code, generics (templates), libraries, containers, design patterns, development tools, version control, documenting, unit testing.
Mode of delivery:
Blended teaching utilizing Moodle-environment (and if necessary, Zoom video-conferencing).
Learning activities and teaching methods:
Video lectures and related exercises (32 h), exercises in a computer lab (24 h or an equivalent amount of independent learning) as well as
required exercises and home assignments (independent work, 77 h).
Target group:
Open university students.
Prerequisites and co-requisites:
The required prerequisite is that the learning outcomes of the following courses are accomplished: Programming 1
Recommended or required reading:
Recommended material, e.g.,
Timothy Budd: Introduction to object-oriented programming, 3rd edition
Vesterholm M., & Kyppö, J.: Java-ohjelmointi (Alma Talent)
Valter Savitch: An Introcution to Problem Solving & Programming, 8th edition (Peason Ltd., 2019),
Sarcar, V.: Java Design Patterns: A Tour of 23 Gang of Four Design Patterns in Java (Apress), and other material announced in the
beginning of the course.
Assessment methods and criteria:
Approved exercises (defined during the course) and home assingments (defined during the course), the total points of which will form the grade. All given tasks are compulsory, they have to be returned and have to be acceptably completed.
Grading:
Numerical scale 1-5 or fail
Person responsible:
Päivi Raulamo-Jurvanen
Other information:
Programming language is Java.

ay811391A: Requirements Engineering (OPEN UNI), 5 op

Voimassaolo: 01.08.2016 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: University of Oulu, Open University

Arvostelu: 1 - 5, pass, fail

Opetus suunnattu: University of Oulu, Open University

Opintokohteen kielet: Finnish

Leikkaavuudet:

811391A   Requirements Engineering   5.0 op

ECTS Credits:
5 ECTS credits /133 hours of work
Language of instruction:
The course has two parallel implementations: one in Finnish and one in English.
Timing:
The course is held in the spring semester, during period 4.
Learning outcomes:
After completing the course, the student will be able to:
- apply requirements engineering skills and techniques individually and in teams, and understands the requirements fundamentals,
- choose and apply some of the requirements elicitation techniques,
- choose and apply some of requirements specification and documentation techniques, as well as
- apply appropriate requirements validation techniques, as well as learn new requirements engineering methods and techniques.
Contents:

- Requirements traceability
- Different stakeholder viewpoints and requirement categories
- Requirements change
- Problem structuring methods
- Requirements engineering skills and techniques in iterative development environment
- Requirements identification, elicitation, specification and documentation techniques
- Requirements prioritization and validation techniques

Mode of delivery:
Blended teaching utilising moodle, zoom lectures and exercises, supplementary videos and examples, face-to-face teaching

Learning activities and teaching methods:
Lectures and exercises 32h; independent work, group project and individual work 101h. Alternatively, independend study and book exam 133h.

Target group:
 Open university students

Prerequisites and co-requisites:
The required prerequisite is that the learning outcomes of the following courses and their predecessors are accomplished: Introduction to Software Engineering

Recommended optional programme components:

Recommended or required reading:
Coursebook available electronically in university library for the students of University of Oulu; Wiegers, Karl & Beatty, Joy (2013). Software Requirements, 3rd Edition.

Assessment methods and criteria:
Active participation (lectures, weekly assignments, group project and individual project), or alternatively book exam

Grading:
Numerical scale 1-5 or fail

Person responsible:
Markus Kelanti

Working life cooperation:
Guest lectures

ay812354A: Servitisation, Co-creation and Business Development (OPEN UNI), 5 op

Voimassaolo: 01.01.2021 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: University of Oulu, Open University

Arvostelu: 1 - 5, pass, fail

Opetus suunnattu: University of Oulu, Open University

Opettajat: Karin Väyrynen

Opintokohteen kielet: English

Leikkaavuudet:

812354A   Servitisation, Co-Creation and Business Development   5.0 op

ECTS Credits:
5 ECTS credits / 133 hours of work

Language of instruction:
The language of instruction of the course is English.

Timing:
The course is held in the autumn semester, during period 2.

Learning outcomes:
After completing the course, the student will be able to:
- develop software business in new businesses and established businesses,
- conduct market analysis to estimate the market potential for the business,
- apply the basics of financial calculation,
- understand differences in business models,
- understand the concept of servitization, as well as
- understand the concept of co-creation.

Contents:

The course takes the perspectives of both new businesses and established businesses and their development. Students develop a new software business idea and write a business plan based on the idea. In addition, students are introduced to the concepts of servitization and co-creation, with special focus on already established businesses.

Mode of delivery:
Pre-recorded lecture videos and reading material in Moodle, mandatory'face to face' exercises (in-class or equivalent in Zoom)

Learning activities and teaching methods:
Lecture videos and independent reading of material 16 hours, exercises 14 hours, individual and team assignments 73 hours, (home) exam 30 hours

Target group:
Open university students.

Prerequisites and co-requisites:
The recommended prerequisite is that the learning outcomes of the following courses and their predecessors are accomplished: Digitalisation and Innovation

Recommended or required reading:
Provided in Moodle workspace

Assessment methods and criteria:
The final grade is composed of the evaluations of the Business plan (teamwork), other individual/team assignments, and (home) exam.

Grading:
Numerical scale 1-5 or fail

Person responsible:
Karin Väyrynen

ay811372A: Software Development, Maintenance and Operations (OPEN UNI), 5 op

Voimassaolo: 01.08.2019 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: University of Oulu, Open University

Arvostelu: 1 - 5, pass, fail

Opetus suunnattu: University of Oulu, Open University

Opettajat: Mika Mäntylä

Opintokohteen kielet: English

Leikkaavuudet:

811372A	Software Development, Maintenance and Operations	5.0 op
815312A	Software Production and Maintenance	5.0 op

ECTS Credits:
5 ECTS credits / 133 hours of work

Language of instruction:
The language of instruction of the course is English.

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

Learning outcomes:
After completing the course, the student will able to:
- explain and utilize theories of software evolution,
- utilize the processes, techniques and tools for software deployment, and operations,
- utilize the processes, techniques and tools for software maintenance, as well as
- utilize the processes, techniques and tools to better understand and maintain large code bases.

Contents:
- Software Maintenance and Evolution
- Software Product Lines
- Software Maintenance and Evolution Models
- DevOps
- Reengineering
- Legacy Systems

Mode of delivery:

Blended teaching
Learning activities and teaching methods:
Lectures (Video): 20 h, exercises / assignments 78 h, weekly study 42 h
Target group:
Open university students.
Prerequisites and co-requisites:
The required prerequisite is that the student has completed BSc degree as well as has basic knowledge on Software Engineering and programming.
Recommended or required reading:
Videos, books, exercises
Assessment methods and criteria:
Exercises, assignements
Grading:
Numerical scale 1-5 or fail
Person responsible:
Mika Mäntylä

ay521457A: Software Engineering (OPEN UNI), 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: University of Oulu, Open University

Arvostelu: 1 - 5, pass, fail

Opetus suunnattu: University of Oulu, Open University

Opettajat: Juha Röning

Opintokohteen kielet: Finnish

Leikkaavuudet:

   521457A   Software Engineering   5.0 op

ECTS Credits:
5
Language of instruction:
Finnish / English
Learning outcomes:
1. After finishing the course, the student knows the basic concepts of software engineering
2. The student also knows the different areas of project management, the phases of software development
3. The student can defines goals and tasks for each phase of development
4. The student knows the principles of secure software development
5. The student knows the metrics used in software engineering and is able to apply them
6. The student is familiar with tools commonly used in software engineering.
Contents:
Problematics of software development and the special features of real-time systems in this regard. Software development is viewed in regard to project management and actual implementation: 1. process models, 2. requirements specification, 3. project management basics: design, metrics, risk management, resource management, follow up, quality control, product control, 4. software testing methods and strategies, 5. introduction to object-oriented analysis and design. 6. Agile software development. 7. Secure software engineering
Mode of delivery:
Face-to-face or online learning
Learning activities and teaching methods:
The course consists of lectures and independent practical exercises. The course is completed by a final exam or learning diaries and successfully completed practical exercises. Lectures 30 h, laboratory design (in period 3) 8 h, the rest of the self-study.
Target group:
Open university students
Prerequisites and co-requisites:
521141P Elementary Programming, 521286A Computer Systems or 521142A Embedded Systems Programming.
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:

R.S. Pressman: Software Engineering - A Practitioner's Approach. Eight Edition. McGraw-Hill 2010. Older editions (6. and 7.) can also be used with some additional material.
Assessment methods and criteria:
Final exam and accepted laboratory exercise.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
The course unit utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.
Person responsible:
Juha Röning