Opasraportti

The Department of Information Processing Science (2012 - 2013)

Tutkintorakenteet

Degree Programme in Information Processing Science, Bachelor Level Studies

Tutkintorakenteen tila: published

Lukuvuosi: 2012-13

Lukuvuoden alkamispäivämäärä: 01.08.2012

General Studies (vähintään 3 op)

810029Y: Orientation studies, 3 op

Language and Communication Studies (vähintään 10 op)

Students may perform individually applying for a foreign language written and oral part, the English language instead of French or German language

902002Y: English 1 (Reading for Academic Purposes), 2 op
902004Y: English 2 (Scientific Communication), 2 op
901004Y: Swedish, 2 - 3 op
900050Y: Written and Oral Communication Skills, 4 - 5 op

Basic Studies (vähintään 44 op)

810124P: Computer Architecture, 6 op
811120P: Discrete Structures, 5 op
811171P: Humans as Users and Developers of Information Technology, 4 op
811168P: Information Security, 5 op
030005P: Information Skills, 1 op
810136P: Introduction to Information Processing Sciences, 5 op
811169P: Introduction to Information Systems Design, 6 op
811192P: Introduction to Programming in C, 5 op
811174P: Introduction to Software Business, 5 op
811176P: Programming Assignment, 2 op

Intermediate Studies (vähintään 98 op)

811383A: Bachelor Thesis, 7 op
811380A: Basics of Databases, 7 op
811379A: Basics of Human Computer Interaction, 5 op
811147A: Basics of Statistical Data Analysis for Information Processing Science, 4 op
813316A: Business Process Modeling, 5 op
811312A: Data Structures and Algorithms, 5 op
812304A: Information Systems in Organizations, 6 op
812334A: Information systems planning, 6 op
811338A: Internet and Computer Networks, 5 op
811382A: Introduction to research work, 4 op
812346A: Object Oriented Analysis and Design, 6 op
812347A: Object-Oriented Programming, 6 op
811365A: Project I, 7 op
811311A: Project Management Principles, 3 op
811391A: Requirements Engineering, 5 op
815347A: Software architectures, 6 op
811335A: Software engineering, 6 op
811375A: User Interface Programming, 5 op

Minor Studies (vähintään 25 op)

The bachelor's degree includes at least 25 credits from compulsory minor subjects. Recommended minor subjects include statistics, maths, engineering, economics and Work Science. Basic study modules are usually presented in minor subjects providing data for municipalities, departments and study guides. These subjects can also be carried out at other universities and colleges as well as the Open University.

Degree Programme in Information Processing Science, Master's Level Studies

Tutkintorakenteen tila: published

Lukuvuosi: 2012-13

Lukuvuoden alkamispäivämäärä: 01.08.2012

Compulsory Studies for all Master's Level Students (vähintään 51 op)

813613S: Master's Thesis, 30 op
813602S: Master's thesis seminar, 2 op
812631S: Project II, 14 op
813621S: Research Methods, 5 op

Specialization Studies (vähintään 39 op)

For the master's studies, a student should choose either information systems or software engineering as his/her study orientation. The choice will be made at the end of the bachelor studies or at the latest at the beginning of the master's studies, by defining it explicitly as part of the personal study plan.

Software Engineering Oriented Module

815308A: Embedded Software Development Environments, 4 op
815653S: Open Source Software Development, 4 op
815309A: Real Time Distributed Software Development, 6 op
817602S: Software Development in Global Environment, 5 op
815660S: Software Engineering Management, Measurement and Improvement, 4 op
815661S: Software Engineering Research, 7 op
815310A: Software Production and Maintenance, 4 op
815311A: Software Quality and Testing, 5 op

Information Systems Oriented Module

813619S: Emerging Technologies and Issues, 4 op
812350A: Enterprise Systems, 4 op
817604S: ICT and Organizational Change, 5 op
812349A: IT Infrastructure, 5 op
813623S: Information Security Policy and Management in Organisations, 5 op
813624S: Information Systems Theory, 7 op
812335A: Interaction Design, 4 op
817603S: System Design Methods for Information Systems, 5 op

Optional Studies (vähintään 30 op)

Optional studies must be at least 30 ECTS credit points. Optional courses can be chosen either in the advanced (Advanced Module) supply or the second specialisation option compulsory courses, or both. Also a minor, or carried out elsewhere in higher education approved elective courses.

Optional Studies for IS Oriented Module Students

812650S: Advanced Topics in Human-Centred Design, 5 op
817608S: Digital Service Innovation and Design, 5 op
817610S: Doing Software Business in China, 5 op
815308A: Embedded Software Development Environments, 4 op
811601S: Emerging Trends in Software Testing, 5 op
812651S: ICT and Behaviour Change, 5 op
815653S: Open Source Software Development, 4 op
815309A: Real Time Distributed Software Development, 6 op
814340A: Small-Group Tutoring, 3 op
813630S: Software Business Development, 5 op
817602S: Software Development in Global Environment, 5 op
815660S: Software Engineering Management, Measurement and Improvement, 4 op
815310A: Software Production and Maintenance, 4 op
815311A: Software Quality and Testing, 5 op
812671S: Usability Testing, 5 op

Optional Studies for SE Oriented Module Students

812650S: Advanced Topics in Human-Centred Design, 5 op
817608S: Digital Service Innovation and Design, 5 op
817610S: Doing Software Business in China, 5 op
813619S: Emerging Technologies and Issues, 4 op
811601S: Emerging Trends in Software Testing, 5 op
812350A: Enterprise Systems, 4 op
812651S: ICT and Behaviour Change, 5 op
817604S: ICT and Organizational Change, 5 op
812349A: IT Infrastructure, 5 op
813623S: Information Security Policy and Management in Organisations, 5 op
814601S: Progressive sandwich training, 5 op
814340A: Small-Group Tutoring, 3 op
813630S: Software Business Development, 5 op
817603S: System Design Methods for Information Systems, 5 op
812671S: Usability Testing, 5 op

Minor or other studies

Master's Degree Programme in Software, Systems and Service Development (GS3D)

Tutkintorakenteen tila: published

Lukuvuosi: 2012-13

Lukuvuoden alkamispäivämäärä: 01.08.2012

Compulsory Studies (vähintään 95 op)

817604S: ICT and Organizational Change, 5 op
812349A: IT Infrastructure, 5 op
813623S: Information Security Policy and Management in Organisations, 5 op
813624S: Information Systems Theory, 7 op
813613S: Master's Thesis, 30 op
815653S: Open Source Software Development, 4 op
810129P: Orientation Studies for International Students, 4 op
817606S: Project in Distributed Global Context, 11 op
813621S: Research Methods, 5 op
813620S: Software Business Management, 5 op
817602S: Software Development in Global Environment, 5 op
815660S: Software Engineering Management, Measurement and Improvement, 4 op
815661S: Software Engineering Research, 7 op
817603S: System Design Methods for Information Systems, 5 op

Optional Studies (vähintään 25 op)

Optional studies must be at least 25 ECTS credit points. Optional courses can be chosen in the optional course pool (see below). Also a minor, or carried out elsewhere in higher education approved elective courses.

812650S: Advanced Topics in Human-Centred Design, 5 op
817608S: Digital Service Innovation and Design, 5 op
817610S: Doing Software Business in China, 5 op
815308A: Embedded Software Development Environments, 4 op
813619S: Emerging Technologies and Issues, 4 op
812350A: Enterprise Systems, 4 op
812651S: ICT and Behaviour Change, 5 op
812335A: Interaction Design, 4 op
815309A: Real Time Distributed Software Development, 6 op
813630S: Software Business Development, 5 op
815310A: Software Production and Maintenance, 4 op
815311A: Software Quality and Testing, 5 op
812671S: Usability Testing, 5 op

Tutkintorakenteisiin kuulumattomat opintokokonaisuudet ja -jaksot

300002M: Advanced Information Skills, 1 op
811336A: Collective capabilities and information processing, 1 - 5 op
814602S: Design and Analysis of Computer Algorithms, 5 op
816663S: Designing Secure Systems and Software, 5 op
811600S: Emerging Trends in Software Engineering, 5 op
813614S: Information Processing and Collective Capabilities, 1 - 4 op
813605S: Pro gradu thesis (minor subject), 21 op
814660S: Program Correctness, 5 op
812670S: The Next Generation of the Web, 5 op

Opintojaksojen kuvaukset

Tutkintorakenteisiin kuuluvien opintokohteiden kuvaukset

810029Y: Orientation studies, 3 op

Opiskelumuoto: General Studies
Laji: Course
Vastuuyksikkö: Department of Information Processing Science
Arvostelu: 1 - 5, pass, fail
Opettajat: Heli Alatalo
Opintokohteen kielet: Finnish

ECTS Credits:
ECTS credits: 3 ECTS credits/80 hours of work.
Language of instruction:
Finnish
Timing:
Timing: 1st year, autumn and spring semester, periods 1+2+3+4.
Learning outcomes:
Learning outcomes: After passing the course a student:

• Recognises from the viewpoint of his/her university studies the actions and services of the most important units, organisations and societies and his/her action possibilities in them;
• Recognises the characteristics of the university-level studies, own curriculum and the discipline of Information Processing Science from the viewpoint of his/her stud-ies and their planning;
• Is able to discuss on the purpose of his/her studies and the upcoming study path;
• Is able to create and present his/her own Personal Study Plan (PSP);
• Knows the city of Oulu and its services.
Contents:
Contents: 1. Common occasions and lectures, 2. Small group activities (student tutoring), 3. PSP process, 4. Science library Tellus and Oula database, 5. Teacher tutoring.

Mode of delivery:
Mode of delivery: Face-to-face teaching and web-based teaching.
Learning activities and teaching methods:
Learning activities and teaching methods: Common occasions and lectures 16h, small-group activities (student tutoring) 15h, PSP process 8h, independent personal work 25h and teacher tutoring 16h.
Target group:
1st year
Recommended or required reading:
Lecture materials, www-pages, study guides, brochures and forms.
Assessment methods and criteria:

Assessment methods and criteria: Active participation in lectures, common occasions, small group activities (student tutoring) and teacher tutoring. Creating and returning PSP to WebOodi.
Grading:
Approved / failed.
Person responsible:
Heli Alatalo

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

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Language Centre

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Proficiency level:
B2/C1 on the [Common European Framework of Reference](#) scale.
Status:
In the Faculty of Science, this course is mandatory for all degree programmes except Geography. Please consult the Faculty Study Guide to establish the language requirements for your own degree programme.
Required proficiency level:
English must have been the A1 or A2 language at school or equivalent English skills should have been acquired otherwise.
ECTS Credits:
2 ECTS credits (total work load 54 hours including classroom meetings.
Language of instruction:
Both English and Finnish are used.
Timing:
Biological Sciences: 1st year spring term
Chemistry: 1st year autumn term
Geology: 1st year spring term
Information Processing Science: 1st year spring term
Mathematical Sciences: 1st year spring term
Physical Sciences: 1st year autumn term
Learning outcomes:
In this course, students improve their understanding of written academic English used in texts in Natural Sciences as well as expand their general and scientific vocabulary. Students become aware of their own role in learning and will be able to find and take advantage of useful study materials available on the Internet in order to develop their own language learning strategies, which will enhance their academic English. Students show their awareness and their own responsibility by reflecting on their achievements in a study journal.
  Learning outcomes: By completing the tasks of the course, students will
  - have acquired effective vocabulary learning techniques by being able to distinguish parts of words to infer meanings
  - expand their academic vocabulary by using Internet resources such as on-line dictionaries
  - understand and be able to construct basic grammatical structures used in formal written English
  - be able to utilize text structure and cohesion markers when reading academic texts
  - be able to apply effective reading techniques and have necessary skills to extract global and detailed information with considerable ease and speed from general texts related to Natural Sciences as well as texts /textbooks of their own field
Contents:
See above
Mode of delivery:
See below
Learning activities and teaching methods:
The course is carried out in multi-mode, with instruction and student tasks both in class and in the Optima learning environment.
Target group:
1st year students of Biology, Chemistry, Geology, Information Processing Science, Physics, and Mathematics.
Prerequisites and co-requisites:
-
Recommended optional programme components:
See 902004Y Scientific Communication
Recommended or required reading:
Set books for substance studies; journal articles in print and on-line. Further information will be given in the first lesson.
Assessment methods and criteria:
Active and regular participation in classroom sessions, completing the learning tasks (in class and Optima Learning Environment) including the study journal. These are prerequisites for participation in the end of term examination. Exemptions from the examination can be given for excellent work during the course.
Grading:
Pass/Fail

Person responsible:
Jolene Gear
Working life cooperation:
none
Other information:
N.B. Students with grades laudatur or eximia in their A1 English school-leaving examination can be exempted from this course and will be granted the credits by the Faculty of Science.
Resit examinations: Two resit examinations are allowed on the dates set by the Extension School unit of Languages and Communication.

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

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Language Centre

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Leikkaavuudet:

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

Proficiency level:
B2/C1 on the CEFR scales
Status:
This course is mandatory for all 2nd year students (except **geographers**) who will have English as their foreign language in their B.Sc. degree. This includes the students who were exempted from 'Reading for Academic Purposes'(902002Y). Please consult the faculty study guide to establish the language requirements on your own degree programme.
Required proficiency level:
Students taking this course must have had English as the A1 or A2 language at school or the equivalent English skills should have been acquired otherwise. The course 'Reading for Academic Purposes' (902002Y) is a pre-requisite, unless exempted.
ECTS Credits:
The student workload is 53 hrs work/ 2 ECTS credits.
Language of instruction:
English
Timing:
Biology : 2nd year autumn term
Chemistry: 2nd year spring term
Geosciences : 2nd year spring term
Information Processing Science : 2nd year autumn term
Mathematical Sciences : 2nd year spring term
Physical Sciences : 2nd year autumn term
Learning outcomes:
The aim of this course is to develop students' oral/aural fluency in a range of general, scientific and academic communication situations.
Skills in pronunciation, listening and speaking are practised in the course.

  Learning outcomes: By the end of the course, you are expected to have:
1. provided evidence of oral fluency in pair work communication and small group discussions.
2. developed effective language learning strategies through autonomous homework.
3. demonstrated the ability to present scientific subjects, using appropriate field-related vocabulary.
4. demonstrated lecture listening skills in field related situations.

Contents:
Skills in listening, speaking, and giving presentations are practised in the course. Homework tasks include autonomous work to support the classroom learning and the task of preparing and presenting a scientific presentation.
Mode of delivery:
Contact teaching
Learning activities and teaching methods:
See above

Target group:
See timing above
Prerequisites and co-requisites:
-
Recommended optional programme components:
-
Recommended or required reading:
Course materials will be provided by the teacher and a copy fee will be charged.
Assessment methods and criteria:
Pass / fail. Assessment is based on regular attendance, active participation in all lessons and the successful completion of all homework tasks.
Alternative method of course completion : An optional exemption test is offered twice per year. The student can only participate in the exemption exam once.
Grading:
Pass / fail.
Person responsible:
Jolene Gear
Working life cooperation:
none
Other information:
-

901004Y: Swedish, 2 - 3 op

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Language Centre

Opintokohteen kielet: Swedish

Leikkaavuudet:

901035Y	Second Official Language (Swedish), Oral Skills	1.0 op
901034Y	Second Official Language (Swedish), Written Skills	1.0 op
ay901004Y	Swedish (OPEN UNI)	2.0 op

Proficiency level:
B1/B2/C1 (CEFR scale)
Status:
This course unit is compulsory to all students except those who have at least 60 ECTS credits of Swedish studies in their degrees. The language proficiency provided by the course unit is equivalent to the language proficiency required of a state official with an academic degree working in a bilingual municipality area (Act 424/03 and Decree 481/03).
Required proficiency level:
The required starting proficiency level for students of all faculties is a grade of 7 or higher from the Swedish studies at secondary school (B-syllabus) or matriculation examination grade A - L or a passing grade from the Brush up course in Swedish 901018Y.
If a student doesn't meet these requirements or his/her language skills are otherwise lacking, he/she must achieve the required proficiency level BEFORE taking this compulsory Swedish course unit. Information about brushing up on one's language skills can be found in Finnish here.
ECTS Credits:
2 ECTS credits (Biochemistry 3 ECTS credits)
Language of instruction:
Swedish
Timing:
See the study guide of the Faculty of Science.
Learning outcomes:
Upon completion of the course unit the student should have acquired the necessary proficiency level in Swedish to be able to manage in the most common communication situations related to his/her professional work tasks. He/she should be able to use basic grammatical structures fairly well in both speech and writing. He/she should be able to use the most common situational phrases understandably in various communication situations. He/she should be

able to find the main points in general academic texts and texts related to his/her field of study and relay this information to colleagues or an audience of laymen using Swedish. He/she should be able to write short texts relating to his/her field of study.

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

Mode of delivery:
Contact teaching

Learning activities and teaching methods:
2 ECTS credits: 28 hours of contact teaching (1 x 180 minutes per week) and related exercises, self-directed study. The course unit's total workload is 53 hours.
3 ECTS credits (biochemistry): 45 hours of contact teaching (2 x 90 minutes per week) and related exercises, 35 hours of self-directed study. The course unit's total workload is 80 hours.

Target group:
Students of the Faculty of Science

Prerequisites and co-requisites:
See Required Porficiency Level

Recommended optional programme components:
-

Recommended or required reading:
The material, which is special field-specific, authentic and up to date, is distributed during the course. Students must pay for their course material.

Assessment methods and criteria:
The course unit focuses on improving both oral and written language skills and requires active attendance and participation in exercises, which also require preparation time. 100% attendance is required. The course unit tests both oral and written language skills. Students participate in the teaching in either autumn semester or spring semester.

Grading:
Assessment is based on continuous assessment and exams. Approved completion of the course unit requires that the student achieves at least satisfactory oral and written language skills. The grades are based on continuous assessment and the course exams. Oral and written language skills are graded separately. The possible grades are satisfactory skills (CERF proficiency level B1) and good skills (CERF proficiency levels B2-C1). For more information on the proficiency levels of oral and written language skills, see Assessment Criteria (in Finnish).

Person responsible:
Lecturer Rauno Varonen

Working life cooperation:
-

Other information:
Teaching will begin according to the schedule

900050Y: Written and Oral Communication Skills, 4 - 5 op

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Language Centre

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

   ay900050Y   Written and Oral Communication Skills (OPEN UNI)   4.0 op

Status:
Students in the Faculty of Humanities select their written and oral communication studies from the course units offered in the Communication Buffet in such a way that the selected course units include both written and oral studies. With most of the course units, the student has the option to choose between versions worth 2 credits or 3 credits; the student may choose to take a 3 credit written skills course and a 2 credit oral skills course - or vice versa - to form the required total amount of 5 credits. The student must discuss the additional assignments required

for the 3 credit version with the teacher of the course unit in question. It is also possible to complete the communication studies with one course unit, which combines both oral and written studies and is worth 5 credits.
Students of Saami Language and Saami Culture complete the Communication Buffet course unit 900050Y-04 Scientific Communication (Tieteellinen viestintä) - 5 ECTS credits.
Students in the Master's Degree Programme in Business Communication may complete their communication studies by taking the course unit 900055Y Communication Skills in Business and Economic Life (Talouselämän viestintä)(3 ECTS credits) intended for students of Economics and one freely selectable course unit (2 ECTS credits) from the Communication Buffet.

Faculty of Science
Students of Information Processing Science complete the course unit in teaching groups reserved for them by **either** taking the course unit 900050-27 Scientific Communication (TOL) (Tieteellinen viestintä [TOL]) - 4 ECTS credits (Option A) **OR** the course units 900050Y-18 Written Communication 1 (TOL) (Kirjoitusviestintä [TOL]) - 2 ECTS credits and 900050Y-26 Oral Communication (TOL) (Puheviestintä [TOL]) - 2 ECTS credits (Option B).

810124P: Computer Architecture, 6 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Petri Pulli

Opintokohteen kielet: Finnish

ECTS Credits:
6 ECTS credits/160 hours of work

Language of instruction:
Finnish
Timing:
Timing: 1 st year, spring semester, period 3
Learning outcomes:
After completing the course, a student understands and manages the software platform for the performance of the structure and activities related to performance, resource needs, and error situations. Students master the basic vocabulary, which is able to communicate and document the software development, particularly in the nearby device applications such as embedded software, mobile systems, multimedia and scientific computing. Students will be able to use and work with computers in their first job as a professional.

Contents:
1. Basics of digital logic and components of a processor
2. Display formats of digital information
3. The processor and its functions
4. The processor instruction set (MIPS and IA32)
5. Assembly language
6. Memory management
7. Input and output
8. Interrupts, device drivers and BIOS
9. Multimedia support
10. Mobile processors
11. Parallel computing
Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:

Lectures 40h, home exercises 15h, laboratory exercises 15h, examination 90h
Target group:

Recommended optional programme components:
-

Recommended or required reading:
Comer; D.E., Essentials of Computer Architecture. Pearson/Prentice Hall. ISBN 0-13-106426-7. 2005. 369 s.

Also examples of the following books are used in lectures:

Tanenbaum A.S., Structured Computer Organizations. 4th Edition. Prentice Hall. 1999. 700 s.
Stallings, W. Computer Organization and Architecture. 5th Edition. Prentice Hall. 2000. 768 s.

Assessment methods and criteria:
Examination
Grading:
1-5
Person responsible:
Petri Pulli
Working life cooperation:
No

811120P: Discrete Structures, 5 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
 5 ECTS credits/134 hours of work
Language of instruction:
finnish
Timing:
1st year, period 1
Learning outcomes:
The student is able to interpret simple mathematical notation and write it by himself/herself. He/she can define the most important concepts that appear in the basic theoretical structures (see Contents) accurately and describe the idea of the definitions. The student also masters the most essential results and (algorithmic) methods of the basic structures and is capable of applying them in easy examples. He/she is able to evaluate certain kinds of simple practical problems in computer science, to choose appropriate theoretical methods to solve the problems, and finally to apply the chosen methods.

Contents:
1.   The concept of algorithm;
2.   Number systems and the conversion of bases;
3.   Logic (proposition calculus, predicate calculus basics);
4.   Set theory, relations and functions (finiteness/infinity, induction);
5.   Basic number theory (divisibility and the respective algorithms);
6.   Combinatory (principles of counting);
7.   Graph theory.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 40h, exercises 30h, autonomous work about 64h.
Prerequisites and co-requisites:
Mastering basic mathematical knowledge as is presented in the high school short mathematics syllabus.
Recommended or required reading:
Lecture slides (about 250 slides), lecture notes (about 100 pages), textbook: Peter Grossman, Discrete Mathematics for Computing, Second Revised Edition, Palgrave Macmillan, 2002. ISBN: 978-0333981115.
Assessment methods and criteria:
Assessment methods and criteria: Lectures by final exam; mandatory exercises by self-contained work.
Grading:
1-5

Person responsible:
Juha Kortelainen
Working life cooperation:
No

811171P: Humans as Users and Developers of Information Technology, 4 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Tonja Molin-Juustila

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay811171P   Humans as Users and Developers of Information Technology (OPEN UNI)   4.0 op

ECTS Credits:
ECTS credits: 4 ECTS credits/108 hours of work
Language of instruction:
Finnish
Timing:
1st year, autumn semester, period 2
Learning outcomes:
After completing the course, students will be able to examine humans as both users and developers of information technology. The student learns core concepts of the phenomenon, and understands their meaning in relation to practice. Students are also familiar with the background of usability research and some of its scientific theories. Students are able to observe and specify a variety of use situations and user experiences of information technologies. Students also understand the challenges of the information technology developers when targeting to create pleasant use experiences for the users of these technologies. After completing the course, students also realize they have started their own journey to become an expert in information technology development.

Contents:
The key themes and concepts of the course are the diversity of information technology, humans as users and developers of information technology, usability, use and user experience, user-centred design.
Mode of delivery:
Face-to-face teaching and self-studying supported with web-based learning.
Learning activities and teaching methods:
Lectures (24h), lecture tasks, exam and work on separate written tasks (about 84h)
Target group:

Recommended or required reading:
Antti Oulasvirta (ed.): "Ihmisen ja tietokoneen vuorovaikutus" (2011), parts I and II. In addition, the material during lectures and other supplementary material.
Assessment methods and criteria:
Course assessment is mainly based on the pre-assignment, lecture assignments, exam and individual essay. In addition, one may improve one's own grade by optional advanced assignment. Assessment criteria will be available in the web-based learning environment.
Grading:
1-5
Person responsible:
Tonja Molin-Juustila
Working life cooperation:
No

811168P: Information Security, 5 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

   ay811168P   Information Security (OPEN UNI)   5.0 op

ECTS Credits:
5 ECTS credits/134 hours of work

Language of instruction:
Finnish
Timing:
Timing: 1st year, spring semester, period 4
Learning outcomes:
After completing the course, a student remembers the main features of the history of information security and is able to define essential security concepts. She/he recognises the different phases of security systems development, is able to evaluate their contents and can describe the fundamental characteristics of planning for security. The student is capable on a basic level of analysing the main scientific methods of information security (risk management, encryption, authentication, access control, etc.) and can explain the functioning of the most important security algorithms and protocols. She/he is able to solve small-scale problems in encryption and authentication and can use security software tools whose functioning principles he/she understands.
Contents:
1.   History and basic structures;
2.   The need and concepts of information security;
3.   Risk management;
4.   Planning of security;
5.   Cryptography;
6.   Access control;
7.   Security protocols;
8.   Software security;
9.   Implementing information security;
10.   Information security maintenance.
Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
Lectures 40h, exercises 30h, autonomous work about 64h
Target group:

Prerequisites and co-requisites:
Mastering the material presented in the courses "811120P Discrete Structures" and "811338A Internet and Computer Networks".

Recommended optional programme components:

Recommended or required reading:
Lecture slides (about 250 slides), lecture notes (about 100 pages), textbook: M. Whitman and H. Mattord, H., Principles of Information Security 2nd ed., Thomson Course Technology, Boston, 2005. ISBN 0-619-21625-5

Assessment methods and criteria:
Lectures by final exam; mandatory exercises by self-contained work
Grading:
1-5
Person responsible:
Mikko Siponen, Juha Kortelainen
Working life cooperation:
No

030005P: Information Skills, 1 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Faculty of Technology

Arvostelu: 1 - 5, pass, fail

Opettajat: Sassali, Jani Henrik, Koivuniemi, Mirja-Liisa

Opintokohteen kielet: Finnish

Leikkaavuudet:

   030004P   Introduction to Information Retrieval   0.0 op

ECTS Credits:
1 ECTS credit
Language of instruction:
Finnish
Timing:
2nd or 3rd year
Learning outcomes:
Students know the different phases of information retrieval process and basic techniques of scientific information retrieval. They will find the most important reference databases of their discipline and know how to evaluate information sources and retrieval results.
Contents:
Retrieval of scientific information, the retrieval process, key databases of the discipline, and evaluation of information retrieval and information sources.
Mode of delivery:
Blended teaching: classroom training, web-based learning material and exercises in Optima environment, a final assignment on a topic of the student's own choice
Learning activities and teaching methods:
Training sessions 8h, group working 7h, self-study 12h
Target group:
Compulsory for all students of the Faculty of Technology. In the Faculty of Science the course is compulsory for students of biology, physics, geosciences, chemistry, geography and information processing science. The course is optional for students of biochemistry and mathematics.
Prerequisites and co-requisites:
-
Recommended optional programme components:
-
Recommended or required reading:
Web learning material https://wiki.oulu.fi/display/030005P.
Assessment methods and criteria:
Passing the course requires participation in the training sessions and successful completion of the course assignments.
Grading:
pass/fail
Person responsible:
Science and Technology Library Tellus, tellustieto (at) oulu.fi
Working life cooperation:
-
Other information:
-

810136P: Introduction to Information Processing Sciences, 5 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Juhani Warsta

Opintokohteen kielet: Finnish

Leikkaavuudet:

   ay810136P   Introduction to information processing sciences (OPEN UNI)   5.0 op

ECTS Credits:
ECTS credits: 5 ECTS credits/134 hours of work
Language of instruction:
Finnish
Timing:
Timing: 1st year of Bachelor studies, autumn semester, periods 1–2
Learning outcomes:
Learning outcomes: Students are able to complete information searches belonging to sub-ject areas related to the course, analyse the information they have found and write short reports and essays.
Contents:
Contents: The course consists of lectures of various aspects of computer science and current research. Practical working life is discussed from the information science point of view. The course also introduces scientific work and its sub-processes through listening, discussing, reading, critical and creative thinking, material search, structuring and writing presentations.

Mode of delivery:
Model of delivery: Blended teaching
Learning activities and teaching methods:
Learning activities and teaching methods: Lectures (28 h), exercise work (35 h), and self-study (71 h). The course uses a web-based learning environment for sharing information and exercises in support of reading.
Target group:

Recommended optional programme components:

Recommended or required reading:
Recommended or required reading: Study material will be announced during the course
Assessment methods and criteria:
Assessment methods and criteria: The course assignments are graded. Extra points can be obtained by showing activity during the lectures.
Grading:

Arvostelu: Hylätty, 1 - 5
Person responsible:
Juhani Warsta

811169P: Introduction to Information Systems Design, 6 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Mikko Rajanen

Opintokohteen kielet: Finnish

Leikkaavuudet:

   ay811169P   Introduction to Information Systems Design (OPEN UNI)   6.0 op

   811170P   Introduction to Information Systems Analysis and Design   6.0 op

   811170P-02   Introduction to Information Systems Analysis and Design, exam   0.0 op

   811170P-01   Introduction to Information Systems Analysis and Design, exercise work   0.0 op

ECTS Credits:
ECTS credits: 6 ECTS credits/160 hours of work
Language of instruction:
Finnish
Timing:
Timing: 1 st year, spring semester, period 4
Learning outcomes:
Learning outcomes: After completing the course, a student can:

• Apply workflow models, context diagrams and use cases for modelling the organisational context of an information system;

• Apply ER diagrams, class diagrams, event lists, use cases, dataflow fragments, combined dataflow diagrams and user interface sketches to model the information content and functionality of an information system;

• Understand the major areas of technical design of an information system, major process models of information systems development, basics of requirements con-struction, basics of information systems implementation, and basics of information systems evaluation.

Contents:
Contents:

1. Introduction to information systems development;
2. Information system and its modelling at the level of the organisational context;
3. Information content and functionality of an information system: a process modelling view;
4. Information content and functionality of an information system: an information mod-elling view;
5. Information content and functionality of an information system: a user interface view;
6. Information systems at the technical level;
7. Process models of information systems development;
8. Requirements construction;
9. Implementation and evaluation of information systems.

Mode of delivery:
Mode of delivery: Face-to-face teaching

Learning activities and teaching methods:
Learning activities and teaching methods: Lectures 27h, exercises 21h, mandatory group work, examination 3h, independent work 109h

Target group:

Recommended optional programme components:

Recommended or required reading:
Study materials: Primarily based on:

- Satzinger, Jackson ja Burd (2007), Systems Analysis and Design in a Changing World
- Hoffer, George and Valacich (2008), Modern systems Analysis and Design, 5th edition

Assessment methods and criteria:
Assessment methods: Exam + mandatory exercise work
Grading:
Grading: Exam: 1–5, exercise work: passed
Person responsible:
Riitta Hekkala
Working life cooperation:
No

811192P: Introduction to Programming in C, 5 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Ilkka Räsänen

Opintokohteen kielet: Finnish

ECTS Credits:
ECTS credits: 5 ECTS credits/134 hours of work
Language of instruction:
Finnish
Timing:
Timing: 1st year, autumn semester, period 2+3

Learning outcomes:

After completing the course the student is able to design a programme by splitting main problem into solvable sub problems. The outcome of design process is modules which she/he is able to write by using chosen programming language. Student is able to use selection and loop structures to control execution of a module and control execution between modules. Student is able to use basic data types for saving and processing data and she/he is able to use right operations to this data. Student is able to use arrays to handle large amounts of same type of data and is able to use control structures to flexibly manipulate the data of arrays. Student is able to use pointers for example to enhance passing large amount of data between modules and at the same time taking care of the risks of using pointers. Student is able to use structured data types that contain fields of different data types and is able to manipulate the fields of these data structures. Student is able to programmatically use files to save permanently large amount of data she/he is able programmatically read data from files for further processing.

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. File processing

Mode of delivery:
Face-to-face teaching.

Learning activities and teaching methods:
Lectures 40h, exercises 24h, self-study 70h.

Recommended or required reading:
Recommended or required reading: http://www.tol.oulu.fi/users/ilkka.rasanen/johdanto.html
Course book: Deitel, Deitel: C HOW TO PROGRAM; Pearson Education Inc. 2007

Assessment methods and criteria:
1. Final exam and exercise points; and 2. Weekly exams and exercise points.

Grading:
1-5

Person responsible:
Ilkka Räsänen

Working life cooperation:
No

811174P: Introduction to Software Business, 5 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Marianne Kinnula

Opintokohteen kielet: Finnish

Leikkaavuudet:

811178P Technology Business and Innovations 5.0 op

ay811174P Introduction to Software Business (OPEN UNI) 5.0 op

ECTS Credits:
5 ECTS credits/134 hours of work

Language of instruction:
Finnish

Timing:
1st year, spring semester, period 4

Learning outcomes:

After completing the course, a student can:
• 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.

Contents:
More details on the course website
Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
Lectures 30h, exercises 20h, independent work 63.5h
Target group:

Recommended optional programme components:
-
Recommended or required reading:
Study materials: Refer to course website
Grading:
Fail, 1 - 5
Person responsible:
Marianne Kinnula

811176P: Programming Assignment, 2 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Ilkka Räsänen

Opintokohteen kielet: Finnish

ECTS Credits:
ECTS credits: 2 ECTS credits/54 hours of work
Language of instruction:
Finnish
Timing:
Timing: 1st year, autumn semester, period 3 + 4
Learning outcomes:
After completing the course, the student can systematically design, implement and test simple programs using C-language as a target language.
Contents:
Contents:

• Problem analysis
• Design
• Implementation
• Documentation
Mode of delivery:
Face-to-face and web-based teaching
Learning activities and teaching methods:
Mode of delivery: Independent work 50h, 2 workshop 4h and web tutoring
Target group:

Prerequisites and co-requisites:
811192P "Introduction to Programming in C"
Recommended optional programme components:

Recommended or required reading:

Introduction to programming lecture material
Assessment methods and criteria:
Accomplish programming assignment
Grading:
Grading: 1–5
Person responsible:
Ilkka Räsänen

811383A: Bachelor Thesis, 7 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Halonen, Raija Helena

Opintokohteen kielet: Finnish

ECTS Credits:
7 ECTS credits/187 hours of work

Language of instruction:

Timing:
3rd year, timing is free
Learning outcomes:
After completing the course, a student is able to:

• Produce their own research work, stage a concrete plan and refine it as the work progresses;
• Find the source materials as well as the library electronic databases;
• Analyse scientific texts and make them a source of criticism;
• Produce well-structured scientific text;
• Identify their work against future problems;
• Ask for advice and the counsellor will use the guidance in favour of work-testing plan.
Contents:
Each student will be guided based on the research literature.
Mode of delivery:
Guided self-motivated work
Learning activities and teaching methods:
Students prepare calendars of work as part of the research plan. The student has personal meetings with the supervisor or instructor to discuss topic selection and scoping, the research plan, the final review of the literature and a thesis draft. The director, depending on the thesis, may also be associated with other students via meetings for interaction.
Target group:
Bachelor level students.
Prerequisites and co-requisites:
Compulsory basic studies in the major subject (about 60 credits) completed, in particular an introduction to research work-study modules to prepare the thesis for BSc. During the course or immediately after, the course is part of the pre-Master's thesis. Written final test conducted on the research topic.

Recommended optional programme components:

Recommended or required reading:
The student's self-written material, institution and the instructor advice and scientific research and support material. Written work must be in compliance with the institution's formal guidelines.

Assessment methods and criteria:

 Course requires a Bachelor's thesis preparation. In addition, the course may be included in the pilot, as determined by scientific research-related tasks.
Grading:
Approved / failed

Person responsible:
Kari Kuutti
Working life cooperation:
No

811380A: Basics of Databases, 7 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Iisakka, Juha Veikko

Opintokohteen kielet: Finnish

Leikkaavuudet:

811318A   Introduction to Data Management   9.0 op

811318A-02   Introduction to data management, exam   0.0 op

811318A-01   Introduction to data management, exercise work   0.0 op

ECTS Credits:
7 ECTS credits/187 hours of work

Language of instruction:
Finnish
Timing:
Timing: 2 nd year, autumn semester, period 2, and spring semester, period 3
Learning outcomes:
After completing the course, students understand what databases are and what their meaning for information systems is. They can model conceptually for database designing purposes, design a high-quality relational database and make queries to it. They have constructed a small MySQL database application. They are able to throw simple XML-database with XML Schema definitions, and they know how to use an object database in an object-oriented programme. They understand transactions, schedules of transactions, serialiseability of schedules and recovery choices of schedules. They also know what different SQL Isolation levels means to safety of transactions.

Contents:
Conceptual modelling (ER- and EER-diagrams), relational model (theory, databases, query techniques and normalization), XML-databases, object-oriented databases, transactions.
Mode of delivery:
Face-to-face

Learning activities and teaching methods:
Lectures 45h, compulsory exercises 24h and (reading 20h) and assignments 27h. Exams 21h. Self-studying 52h.

Target group:

Prerequisites and co-requisites:
Course 812346A "Object Oriented Analysis and Design" or knowledge about object oriented class models.
Recommended optional programme components:

Recommended or required reading:
Silberschatz, Korth & Sudarshan: Database system concepts
Assessment methods and criteria:
Examination

Grading:
1-5
Person responsible:
Juha Iisakka
Working life cooperation:
No

811379A: Basics of Human Computer Interaction, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Anna-Liisa Syrjänen

Opintokohteen kielet: Finnish

Leikkaavuudet:

   ay811379A   Basics of Human Computer Interaction (OPEN UNI)   5.0 op

   812327A   Introduction to HCI design   4.0 op

ECTS Credits:
5 ECTS credits/134 hours of work
Language of instruction:
Finnish
Timing:
Timing: 2 nd year, spring semester, period 4
Learning outcomes:
After completing the course, a student is able to define the basic concepts of user interface design, introduce the basic design process and its steps, the most common design and evaluation methods and tasks, and apply them in the context of graphic user interface design.
Contents:
The terminology and fundamental concepts of the area, user interface, usability, interaction model and context, elements and navigation related to common windowed systems, basics of interaction design process, common usability and design rules, evaluation techniques, universal design and user support.
Mode of delivery:
Face-to-face teaching/blended teaching
Learning activities and teaching methods:
Lectures 20h, assignments and tutoring or one larger assignment 67h, exam preparation and an exam 47h.
Target group:

Prerequisites and co-requisites:
Course "Humans as Users and Developers of Information Technology" (811171P) or similar knowledge.
Recommended optional programme components:

Recommended or required reading:
Dix et al. (2004, 3rd edition or later edition) Human-Computer Interaction or related course books and study materials.
Assessment methods and criteria:
Assessment methods: assignment 50%, exam 50%
Grading:
1-5
Person responsible:
Anna-Liisa Syrjänen
Working life cooperation:
No

811147A: Basics of Statistical Data Analysis for Information Processing Science, 4 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Jouni Markkula

Opintokohteen kielet: Finnish

ECTS Credits:

4 ECTS credits/108 hours of work.
Language of instruction:
Finnish
Timing:
The course is held in the spring semester, during period 3. It is recommended to complete the course in the final phase of bachelor studies.

Learning outcomes:

After completion of the course, the student can identify and describe the basic properties and types of statistical data and is able to apply them in information processing sciences, information systems and software engineering. The student is able to specify metrics and handle statistical variables. She or he is also able to describe, present and analyse descriptive statistical data sets.
Contents:
Types of statistical data, data collection methods, measurement and variables, sampling, management of statistical data, descriptive statistics, graphical presentation of data, basics of data analysis.

Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 20h, exercises 20h, independent work 68h
Target group:

Recommended optional programme components:
-
Recommended or required reading:
Lecture slides, given literature and exercise tasks.
Literature:
• Blaikie, Norman (2003), Analyzing Quantitative Data (section 1-5)
• Other examples from: Wild & Seber (2000), Chance Encounters; Antony (2008), Design of Experiments for Engineers and Scientists; George, Rowlands, Proce, Maxey (2005), Lean Six Sigma Pocket Toolbook
Assessment methods and criteria:
The course is evaluated based on passed exam and acceptable exercise tasks.
Grading:
1-5
Person responsible:
Jouni Markkula
Working life cooperation:
No

813316A: Business Process Modeling, 5 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits/134 hours of work

Language of instruction:
   English

Timing:
The course unit is held in the spring semester, during periods 3 and 4. It is recommended to complete the course in the second year of Bachelor studies.

Learning outcomes:

After completing the course, students are able to model and develop business and work processes, as well as use computer-based process tools. The students are able to distinguish between business process change on the enterprise level, business process level and the implementation level, and to and evaluate these business process changes.

Contents:
Process architecture and how it can be fitted to the organisation, process modelling, process performance measurement, understanding process-related problems, process development, software tools for modelling and analysing processes, exercises.

Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
Lectures 30h, exercises 12h, course assignments 45h, problem-based learning 27h, exam 20h. The problem-based learning will be done as group work, the course assignments and the exam will be done as individual work.

Target group:

Recommended optional programme components:
-
Recommended or required reading:
Harmon, Paul (2007). Business Process Change. A Guide for Business Managers and BPM and Six Sigma Professionals. Morgan Kaufmann Publishers.
Assessment methods and criteria:
Assessment methods and criteria: This course unit utilizes continuous assessment. Lectures are voluntarily, but participation is recommended. The students will write a course assignment and a problem-based learning report, and these will be assessed. In addition, there will be an exam at the end of the course, which will be assessed. The assessment of the course unit is based on the learning outcomes of the course unit.

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

Person responsible:
Karin Väyrynen
Working life cooperation:
No

811312A: Data Structures and Algorithms, 5 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

   521144A   Algorithms and Data Structures   6.0 op

ECTS Credits:
5 ECTS credits/134 hours of work

Language of instruction:
Finnish
Timing:
2nd year, autumn semester, period 2

Learning outcomes:
After completing the course, the student can describe the concept of algorithm and explain what correctness and time complexity of algorithms mean. Furthermore, the student is able to explain the design paradigms presented in the course and to describe the complexity classes of relevant sorting algorithms. The student can analyse simple

algorithms, i.e. to prove their correctness and evaluate their time complexity. Moreover, the student is able to describe the basic data structures and apply essential graph algorithms. Finally, the student can construct suitable data structures and algorithms for given problems; the student can also justify the choice of a data structure or an algorithm for an application.

Contents:
The concept and analysis of algorithms, sorting and searching algorithms and their complexity, algorithm design paradigms, the concept of data structure and basic data struc-tures, hash tables, binary search trees, graphs and their algorithms.

Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
Lectures 40h, exercises 24h, independent work 70h.
Target group:

Prerequisites and co-requisites:
Mastery of subject matter of the course "Discrete Structures" is required.
Recommended optional programme components:

Recommended or required reading:
Cormen, Leiserson, Rivest, Stein: Introduction to algorithms, 2nd edition, MIT Press 2001 (or later). From this edition chapters 1–4, 6–13, 15–16, 22–24, Appendix A and B are covered.
Assessment methods and criteria:
Assessment methods: Exam
Grading:
1-5
Person responsible:
Ari Vesanen
Working life cooperation:
No

812304A: Information Systems in Organizations, 6 op

Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Department of Information Processing Science
Arvostelu: 1 - 5, pass, fail
Opettajat: Juhani Warsta, Seppo Pahnila
Opintokohteen kielet: Finnish

ECTS Credits:
6 ECTS credits/160 hours of work

Language of instruction:
Finnish
Timing:
Timing: 1 st year, autum semester, period 1

Learning outcomes:
Learning outcomes: After completing the course the student is:

• Able to explain the importance of information systems for organisations;
• Able to define the conditions for success of information operations in the organisa-tion;
• Able to explain the main features of information systems development.
Contents:
Fundamentals of organisations, structure and functioning, digital organisation, basic types of information systems, the role of information systems in organisations, the interplay between information systems and organisations, the role of information systems in organisational leadership and decision making, the formation and mastering of organisational information, enterprise resource planning systems, the renewal of organisations with information systems, the

economic aspects of information systems.

Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
Lectures 27h, self-governing reading of course material 133h
Target group:

Prerequisites and co-requisites:
Course "811169P Introduction to Information Systems Design" or equivalent knowledge.

Recommended or required reading:
• Laudon, K.C and Laudon, J.P., Management Information Systems, Prentice-Hall, Upper Saddle River, NJ, 6th edition, 2000, pp. 2–159, 330–367, 398–495 or Seventh edition, 2002, pp. 2–101, 301–429, or 9th edition 2006, pp. 1–111, 378–506, 534–569, or 10th edition, pp. 3–119, 428–523, 552–587.
• Handy, C., Understanding Organizations, Penguin Books, 4th edition, 1999, pp. 13–179.
• Mintzberg, H., Structure in Fives, Designing effective organizations, Prentice-Hall, Englewood Cliffs, 1983, pp. 1–23.
• Nonaka, I. & Takeuchi, H., The Knowledge Creating Company, Oxford University Press, New York, 1995, pp. 56–94, 124–171.
Assessment methods and criteria:
Assessment methods: Exam
Grading:
1-5
Person responsible:
Professor of Information Systems
Working life cooperation:
No

812334A: Information systems planning, 6 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Seppo Pahnila

Opintokohteen kielet: Finnish

ECTS Credits:
6 ECTS credits/160 hours of work

Language of instruction:
Finnish
Timing:
Timing: 3 rd year, spring semester, periods 3–4
Learning outcomes:
After completing the course students are able to explain connection between the information systems designing and the development of operational activities. Students are able to apply development-oriented information systems design methodology.

Contents:
A practical information systems design exercise is carried out in groups of 3–4 students. The focus is on phases of information systems design preceding software design. Assignment is carried out using a chosen information systems design methodology (currently Contextual Design).

Mode of delivery:

Lectures 24h, exercises 24h, course assignment 90h, seminars 12h, individual learning diaries 10h. Passing the course requires 80% attendance.
Learning activities and teaching methods:

Face to face teaching.
Target group:

Prerequisites and co-requisites:
811169P "Introduction to Information Systems Design" and 812346A "Object Oriented Analysis and Design".

Recommended optional programme components:

Recommended or required reading:
Beyer, H. Holtzblatt, K. (1998): Contextual Design: Defining Customer-Centred Systems. San Francisco: Morgan Kaufmann Publishers, Inc.

Assessment methods and criteria:
Group assignment and individual learning diary. The assignment is done according to the contextual design method. The exercises support the fulfilment of the assignment. The results of the assignment are presented in seminars, with comments from opponents. Based on the justifiable reasons, the course can be passed via individual work.
Grading:
1-5
Person responsible:
Seppo Pahnila
Working life cooperation:
No

811338A: Internet and Computer Networks, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Juha Kortelainen

Opintokohteen kielet: Finnish

ECTS Credits:
5 ECTS credits/134 hours of work

Language of instruction:
Finnish
Timing:
Timing: 1 st year, spring semester, period 3
Learning outcomes:
The student is able to describe the functioning of a computer network and how data is transmitted in a network, to list the distinct layers of a network (in two reference models), to estimate the significance and operation of distinct layers and to compare connectionless and connection-oriented transport. She/he identifies the most important network protocols and is able to estimate their functions. The student is able to explain the structure of the Internet addressing system and the general principles according to which routing in IP-networks is carried out. She/he is able to calculate values to parameters describing the capacity of the network (transmission rate, traffic intensity, delay, etc.) and to apply the theory in a computer class, for instance, when analysing the network traffic.

Contents:
1.   The history and development of Internet and WWW;
2.   The basic concepts of computer networks: network devices, physical media, circuit switching, packet switching, delay, loss and throughput, protocols layers and refer-ence models;
3.   The functioning of the application layer, network application architectures, commu-nicating processes, transport services;
4.   Classical network applications: electronic mail, file transfer, remote login, news-groups;
5.   New applications on the Internet: DNS, World Wide Web and HTTP, content distri-bution;
6.   Data transmission on the Internet. UDP protocol: connectionless and simple. TCP protocol: connection-oriented and reliable data transfer;
7.   Addressing and routing on the Internet, IP protocol;
8.   Multimedia: real-time applications, streaming stored audio and video, Internet radio, Internet telephone (VoIP), QoS;

9. Local area networks, multiple access protocols, link-layer addressing, network de-vices, wireless connections;
10. The principles of network security, security in different layers of the network.

Mode of delivery:
Face-to-face teaching, or an alternative way to pass the course (Erasmus students, and some specific cases)
Learning activities and teaching methods:
Lectures 36h, exercises 30h, autonomous work about 68h, or Contact Education, or an alternative way to pass the course (Erasmus students, and some specific cases)
Target group:

Recommended optional programme components:

Recommended or required reading:
Lecture slides (about 250 slides), text book: J. F. Kurose and K. W. Ross, Computer Networking. A Top-Down Approach, 5th Edition, Pearson Education Inc., 2010. ISBN: 978-0-136548-3 and any other material presented in lectures

Assessment methods and criteria:
Assessment methods and criteria: The course is completed and approved the final test and exercises or an alternate way to pass the course (Erasmus students, and some specific cases)
Grading:
1 - 5
Person responsible:
Jouni Kokkoniemi
Working life cooperation:
No

811382A: Introduction to research work, 4 op

Voimassaolo: 01.08.2011 - 31.07.2015

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Halonen, Raija Helena

Opintokohteen kielet: Finnish

ECTS Credits:
4 ECTS credits/108 hours of work

Language of instruction:
Finnish
Timing:
Timing: 3 rd year, autumn semester, period 1,2 and 3
Learning outcomes:
After completing the course, students:

• Are able to discuss the role of research in society and the university, and know the body of research within their own field of science;
• Know the basic elements of the research process for each output;
• Are able to explain the research process;
• Understand the importance of research in scientific publishing;
• Are able to assess the different channels of publication and are able to use at least two ways of assessing publishing quality, i.e. the quality of the publication and the appropriate number of references;
• Understand the importance of scientific argument, know the argument of structural elements and able to analyse simple argument structures;
• Are aware of the role of empirical data in research, are able to apply some of the key data collection and analysis methods and are able to justify a choice among al-ternative approaches;
• Are able to comment on the research report;
• Are able to write queries and retrieve publications in the reference databases.

Contents:
General information about research, scientific publishing, scientific argumentation, methods for empirical data collection and analysis, information searching using scientific databases.
Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
Mode of delivery: Lectures 20h, exercises 80h
Target group:

Prerequisites and co-requisites:
Preparation for candidate thesis, 030005P Introduction to Information Retrieval
Recommended optional programme components:
Preparation for candidate thesis, 030005P Introduction to Information Retrieval
Recommended or required reading:
Lecture notes, exercise notes, scientific publications

Assessment methods and criteria:
Assessment methods and criteria: Participation to lectures and exercises, evaluation of submitted results.
Grading:
Pass/fail or 1–5

Person responsible:
Raija Halonen
Working life cooperation:
No

812346A: Object Oriented Analysis and Design, 6 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Iisakka, Juha Veikko

Opintokohteen kielet: Finnish

ECTS Credits:
6 ECTS credits/160 hours of work

Language of instruction:
Finnish
Timing:
2nd year, autum semester, period 1

Learning outcomes:
After completing the course, the students know possibilities of UML-language family to describe different views. They can picture a task using Use cases and scenarios. Moreover they can produce detailed descriptions using activity-, class-, interaction- and state diagrams. They know principles of object-orientedness and can use abstract as well interface classes. Additionally they can model user interface by state diagrams.
They understand what design patterns are and how they are described and categorised.

Contents:
Principles of object orientation and object-oriented programming; quality criteria of object orientation; design patterns; case use; activity, class, interaction and state machine diagrams; class realisation.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 34h, compulsory exercises and assignments 30h, independent work 96h.
Prerequisites and co-requisites:
Basic knowledge of programming and information systems analysis and design.

Recommended optional programme components:

Recommended or required reading:
: Bennet, McRobb & Farmer: Object-oriented systems analysis and design, Using UML
Assessment methods and criteria:
Assessment methods and criteria: Refer to course website
Grading:
1-5
Person responsible:
Juha Iisakka
Working life cooperation:
No

812347A: Object-Oriented Programming, 6 op

Voimassaolo: - 31.07.2015

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Ari Vesanen

Opintokohteen kielet: Finnish

ECTS Credits:
6 ECTS credits/160 hours of work

Language of instruction:
Finnish
Timing:
2nd year, autumn semester, period 1

Learning outcomes:
After completing the course, the student is able to explain the general objectives and techniques of object-oriented programming paradigm. Furthermore, the student can describe the practical meaning of concepts of object-oriented programming. The student can construct C++ programs that apply inheritance, composition and polymorphism. Finally, the student is able to describe most common design patterns and to design and construct programs that contain the design patterns presented in the course.

Contents:
Introduction to object-orientation, basics of programming in C++ language, composition, inheritance and polymorphism, design patterns, generics, C++ standard template library and containers.

Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
Lectures 32h, laboratory exercises 21h, weekly assignments and independent work 107h
Target group:

Prerequisites and co-requisites:
Courses "811192P Introduction to Programming in C", "811175P Programming Assignment" or similar knowledge.
Recommended optional programme components:

Recommended or required reading:
- Timothy Budd: Introduction to object-oriented programming, 3rd edition.
- Erich Gamma, Richard Helm, Ralph Johnson & John Vlissides: Design patterns – Elements of reusable object-oriented software.
- Bruce Eckel: Thinking in C++ Volume 1, 2nd edition.

Assessment methods and criteria:
Weekly assignments (preferred) or final exam + programming assignment

Grading:
1-5
Person responsible:
Ari Vesanen
Working life cooperation:
No

811365A: Project I, 7 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Lappalainen, Jouni Esko Antero

Opintokohteen kielet: Finnish

Leikkaavuudet:

   811366A   Project Work   10.0 op

ECTS Credits:
7 ECTS credits/201hours of work

Language of instruction:
Finnish
Timing:
Timing: 3 rd year, autumn and spring semester, periods 2–4

Learning outcomes:
After completing the course, the student:

• Can apply the theory of working in a project and project management into practice;
• Can function as a member of a project team;
• Can communicate appropriately with the stakeholders of the project by using both written and spoken language;
• Can apply the experience gained from the design, implementation and testing of the delivered solution for future software and/or research projects.

Contents:
The course contains practical work in a project commissioned by a software company or an academic research project. Within the topics of project development, the following are dealt with during the course: the project as a way of working, project planning, project implementation and ending the project.

Mode of delivery:
Face-to-face (project teaching)

Learning activities and teaching methods:
Lectures 1h, project work 200h.

Target group:

Prerequisites and co-requisites:
"Project Management Principles" (811311A). Also check the prerequisites for working within a project from the prerequisites of the aforementioned course description.
Recommended optional programme components:

Recommended or required reading:
Material from the previous project courses, in addition a project manual within the course www-space.

Assessment methods and criteria:

Assessment methods: The student must work toward the completion of the project tasks for the required amount of time.
Grading:
pass / fail

Person responsible:
Jouni Lappalainen
Working life cooperation:
Yes, the students work with the topics ordered by customer organisations, while simulating as authentically as possible the software development within a real working environment.

811311A: Project Management Principles, 3 op

Voimassaolo: 01.01.2012 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Tonja Molin-Juustila

Opintokohteen kielet: Finnish

Leikkaavuudet:

   811366A   Project Work   10.0 op

ECTS Credits:
3 ECTS credits/80 hours of work
Language of instruction:
Finnish
Timing:
3 rd year, autumn semester, period 1

Learning outcomes:
After completing the course the student understands and can explain central concepts, methods, and capabilities of various necessary roles in software projects of moderate size and assurance. The student understands and can explain typical software project risks, knows how to prepare for them, how to collect the necessary data and how to take critical project decisions from the project outset to completion.

Contents:
Project and project team organisation; project roles and tasks; decision making; software project operation definition and evaluation. Plan-driven and agile software development. Software project management, planning, scope management and schedule; change management; quality and risk management; project planning, tracking, reporting and review. The project manager's leadership capabilities.
Mode of delivery:
Face-to-face teaching and workshops
Learning activities and teaching methods:
Lectures, lecture assignments and workshops about 80h.
Prerequisites and co-requisites:
Compulsory prerequisites are the following courses: Introduction to Programming in C (811192P) and Programming Assignment (811176P), Object-Oriented Programming, either weekly assignments or exercises work completed (812347A), Data Structures and Algorithms (811312A), Introduction to Information Systems Design (811169P), Basics of Databases (811380A) and programming assignment and Software Engineering (811335A). The above courses also serve as a compulsory forerunner to a course Project 1 (811365A). Prerequisites do not apply to those students who have already completed a Bachelor's degree or higher degree, or other equivalent degree.
Recommended or required reading:
Lecture slides, R. Pressman, Software Engineering: A Practitioner's Approach. McGraw-Hill, 2005 and any other material presented in lectures.
Assessment methods and criteria:
Lectures and workshops, including workshop reports.
Grading:
Pass/fail
Person responsible:

Tonja Molin-Juustila
Working life cooperation:
No

811391A: Requirements Engineering, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Saukkonen, Samuli

Opintokohteen kielet: Finnish

Leikkaavuudet:

   ay811391A   Requirements Engineering (OPEN UNI)   5.0 op

ECTS Credits:
5 ECTS credits/134 hours of work

Language of instruction:
Finnish
Timing:
Timing: 3 rd year, autumn semester, period 2
Learning outcomes:
After completing this course, the student can analyse the requirements from the problem-domain and solution-domain viewpoints, and understands the special issues associated with these viewpoints. The student can distinguish the roles of problem-domain and solution-domain requirements for the customer and developer; he/she is able to identify various project types and knows which requirement style fits best to each project type. The student will be familiar with various requirement definition styles together with their pros and cons, and is able to use some of the most important definition styles. Several requirements of elicitation techniques will be added to the student's toolbox with the skills of mastering some of them. The principles of requirements management, validation and verification during the product life cycle will be familiar to the student at the end of this course.

Contents:
Concepts of problem and solution domain. Requirements in different use contexts. Description styles for functional and non-functional requirements. Validation and verification of requirements. Requirements negotiation and prioritisation. Release planning. Requirements management during the product life cycle.

Mode of delivery:
The tuition will be implemented as face-to-face teaching.

Learning activities and teaching methods:
Lectures 32h, weekly assignments and project assignment about 102h.
Target group:

Prerequisites and co-requisites:
We assume the basic skills from the following courses: "811169P Introduction to Information System Design", "812346A Object-Oriented Analysis and Design", "811380A Basics of Databases", "811335A Software Engineering" and "812334A Information Systems Planning".
Recommended optional programme components:

Recommended or required reading:
S. Lauesen, Software Requirements – Styles and Techniques. Pearson Education 2002; chapters 1–4 and 6–9. A.M. Davis, Just Enough Requirements Management, Dorset House Publishing 2005; parts. Lecture slides.

Assessment methods and criteria:
Two ways of passing:
1)   Active participation: weekly assignments and project assignment (only for Finnish-speaking students)
2)   Conventional exam
Grading:

Active participation will be evaluated based on the weekly assignments and the project work; the scale will be 1–5. The exam will be evaluated on a scale of 1–5.

Person responsible:
Samuli Saukkonen
Working life cooperation:
No

815347A: Software architectures, 6 op

Voimassaolo: - 31.07.2016

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Juustila, Antti Juhani

Opintokohteen kielet: Finnish

ECTS Credits:
6 ECTS credits/160 hours of work

Language of instruction:
Finnish
Timing:
Timing: 3 rd year, spring semester, period 3
Learning outcomes:
After the course, the student is able to identify and analyse different software architecture solutions and understands the pros and cons of each solution from the perspective of building and executing the software, as well as from the viewpoints of quality and maintainability. The student is able to describe software architecture solutions and the elements of such, including the interfaces between the elements, using UML. The student is able to create alternative architectural solutions based on the functional and non-functional requirements of the software, and evaluate the suitability of the solution regarding the purpose of the software. The student is able to identify the differences between the design of product/product family architectures with conventional software architectures.

Contents:
Software architecture foundations, architecture documenting, components and interfaces, dependencies, design patterns, styles, product line architectures, frameworks and architecture evaluation methods.

Mode of delivery:
Face-to-face teaching.
Learning activities and teaching methods:
Lectures 30h, exercises 20h, assignment 90h and examination 20h.
Target group:

Prerequisites and co-requisites:
General knowledge of software development, UML basics and general experience with object-oriented programming (included in courses: 811335A "Software engineering", 812346A "Object oriented analysis and design").
Recommended optional programme components:

Recommended or required reading:
K. Koskimies, T. Mikkonen: Ohjelmistoarkkitehtuurit. Talentum 2005; L. Bass, R. Clements, R. Kazman: Software Architecture in Practice. Addison-Wesley 2003; Web pages at http://www.tol.oulu.fi/users/lech.krzanik/cbsd.htm
Assessment methods and criteria:
 Lectures are not obligatory though strongly recommended. Other parts are obligatory, evaluated, and have the following pass thresholds: weekly exercises: 40% tasks; assignment stages 1–3: pass/fail; examination: 15 points.
Grading:
There's no compulsory presence required in the lectures. For other parts, presence is required and performance is scored. Limits to pass: 40% of weekly exercises; exercise work is acceptable; minimum of 15 points acquired from the examination.

Person responsible:
Antti Juustila
Working life cooperation:
No

811335A: Software engineering, 6 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Tervonen, Ilkka Tapio

Opintokohteen kielet: Finnish

ECTS Credits:
6 ECTS credits/160 hours of work

Language of instruction:
Finnish
Timing:
Timing: 2 nd year, spring semester, period 3
Learning outcomes:
After completing the course, a student is able to explain various aspects of software engineering areas such as process models, requirement specification, analysis and design methods, quality management and project management, their importance and know how to use them for small-scale task solving. A student is familiar with software engineering practices and activities (review, testing, software product management, risk management, project management) and knows how to use them in software development at different levels. A student can explain the maintenance and redesign of software evolution and its importance.
Contents:
Software process, software requirements, software design methods, software engineering practices, software quality management, software project management
Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
Implementation methods of the course vary: a) Lectures 32h, exercises 24h, study group working 40h, assignment 40h and self-study 24h; b) Lectures 32h, exercises 24h, exam 64h, assignment 40h; c) Lectures 32h, exercises 24h, essay 64h, assignment 40h.
Prerequisites and co-requisites:
Course "811169P Introduction to Information Systems Design" and "812346A Object Oriented Analysis and Design" or similar knowledge.

Recommended optional programme components:

Recommended or required reading:
Pressman R., Software Engineering, A Practitioner's Approach, 7 th edition, McGraw-Hill, 2010, lecture material
https://noppa.oulu.fi/noppa/kurssi/811335a/luennot
Assessment methods and criteria:
Exam and assignment, exam can be replaced by study group work or essay.
Grading:
1-5
Person responsible:
Ilkka Tervonen
Working life cooperation:
No

811375A: User Interface Programming, 5 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Lappalainen, Jouni Esko Antero

Opintokohteen kielet: Finnish

ECTS Credits:
5 ECTS credits/134 hours of work

Language of instruction:
Finnish
Timing:
Timing: 3 rd year, autumn semester, periods 1 + 2
Learning outcomes:
After completing the course, the student can implement a software application that utilises a database for storage and has a graphical user interface. The GUI (as well as the entire application) must be developed by implementing usability design principles from the beginning of the development process.

Contents:
The course deals with the following: UI elements, foundations of the Swing library, UI design principles, layout managers, MVC-paradigm, event-driven programming, web-usability, JSP, programmatically utilising databases, JDBC.

Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Exercise 33h, coursework 75h, independent study 26h.
Target group:

Prerequisites and co-requisites:
Knowledge and skills of the course "811380A Basics of Databases" and fundamentals of user interface design. In addition, the knowledge and skills of object-oriented programming are needed.
Recommended optional programme components:

Recommended or required reading:
Lectures in textual format within the course web space. In addition (if needed), for example Kosonen, Peltomäki & Silander (2005). Java 2 ohjelmoinnin peruskirja. Docendo.
Assessment methods and criteria:
Assessment methods: the student must submit coursework that fulfils the given requirements (defined during the course).
Grading:
Grading: 1–5 / fail
Person responsible:
Jouni Lappalainen, Mikko Rajanen
Working life cooperation:
No

813613S: Master's Thesis, 30 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

ECTS Credits:
30 ECTS credits/800 hours of work.

Language of instruction:

Finnish/English.

Timing:
Timing is free; execution can be allocated over several semesters. Obligatory for Master's degree. During 1st and 2nd year of Master's studies.
Learning outcomes:
After completing the thesis the student can:

* Define a relevant focused problem in the field of information processing science;
* Apply a scientific method as a tool in solving the stated research problem;
* Synthesise research results and evaluate their validity;
* Write a scientific thesis based on the accomplished research according to the de-partment's guidelines;
* Participate in the evolution of ICT and postgraduate studies after completing the thesis.

Mode of delivery:
Face-to-face meetings and electronic communication with the supervisor.

Learning activities and teaching methods:
Conducting and reporting research under supervision of personal advisor.
Prerequisites and co-requisites:
The research plan and the final draft of the thesis will be presented in the "Master's Thesis Seminar" (813602S).

Grading:
The supervisor and a second independent reviewer will evaluate the thesis using the scale 1–5.
Person responsible:
Professors of the department.

Working life cooperation:
Especially empirical Master's theses are often done in cooperation with private or public sector.

813602S: Master's thesis seminar, 2 op

Voimassaolo: - 31.07.2015
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Department of Information Processing Science
Arvostelu: 1 - 5, pass, fail
Opettajat: Similä, Jouni Kalervo
Opintokohteen kielet: Finnish

Required proficiency level:

ECTS Credits:
2 ECTS credits/54 hours of work.

Language of instruction:
Finnish / English
Timing:
1st – 2nd year of Master's studies, autumn and spring semesters, periods 1–4.

Learning outcomes:
By completing this course the student can plan scientific study, is capable of presenting own research plan and final draft of own Master's thesis, and understands the approach the reviewers use to evaluate a thesis.

Contents:
Contents: See "assessment methods" below
Mode of delivery:
Mainly face-to-face seminar meetings, if needed telecom meetings are possible.
Learning activities and teaching methods:
Planning and presenting the student's own research. Listening to peers' research plans and research reports.

Target group:

Prerequisites and co-requisites:
"813613S Master's thesis" course
Recommended optional programme components:

Recommended or required reading:
Guidelines to producing a Master's thesis.

Assessment methods and criteria:
Active participation in at least seven seminar sessions. One session lasts about 2 hours and they are arranged during the semesters according to the plan published on the website. The students will present their own research plan and the research before official evaluation. During the presentation the research will be discussed critically by an opponent.
Grading:
Pass/fail

Person responsible:
Jouni Similä
Working life cooperation:
No
Other information:
Website: http://www.tol.oulu.fi/index.php?id=822

812631S: Project II, 14 op

Voimassaolo: - 31.07.2014

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Tonja Molin-Juustila

Opintokohteen kielet: Finnish

Leikkaavuudet:

   812610S   Project seminar   4.0 op

ECTS Credits:
14 ECTS credits/370 hours of work

Language of instruction:
English/Finnish.
Timing:
1st year of Master's studies for three periods: spring semester, periods 3 & 4; and 2nd year, autumn semester, period 1 (recommended). Or 2nd year, autumn semester, periods 1 & 2; and spring semester, period 3.

Learning outcomes:
After completing the course students should demonstrate their abilities to work on a challenging ICT project. Students will learn to acquire and apply new knowledge in the topic of the project, as well as to analyse and report the created new knowledge to peer student groups. Students will also demonstrate their skills to conduct an ICT project in a professional way. By completing this course, students can act as independent professional members of an ICT project. The skills learnt are in two parts: expertise in the project topic and pro-fessionalism in the project work and management.

As an expert in the topic area the student:
• Can search research articles on some topic of the project;
• Can apply this knowledge in his/her project work;
• Can evaluate the results of the project and the practical experiences gained during the project against the literature and research;

- Can disseminate the results and experiences in credible way to peers both by a writ-ten report and orally.

As a professional in conducting a project in managed way the student:
- Can plan the project;
- Can search up to date information on the topic of the project and apply this in the project work;
  - Can manage the progress of the project with the steering group/project team or-ganisation (reporting the progress and results of the project, the use of the steering group in decision making and problem resolution);
- Can follow the progress of the project in real time within the project team;
- Can work as a responsible project team member;
- Can produce realistic outcome in relation to project resources.

Contents:
Starting lecture, where the steps of carrying out the course will be described together with allocating the project assignments to project teams. The project work will take about two periods (one semester) followed by the third period for analysis, reporting and presentation of the expertise on the topic.

Mode of delivery:
Face-to-face teaching at the beginning and in the end together with web-based learning environment, mainly project work as collaborative team work, each project group supported with private supervisor.

Learning activities and teaching methods:
Project work 300h and seminar ca. 70h per student. Attendance at the starting lecture and the presentation sessions (1–2 days) is mandatory. International exchange students have an option to participate only in the project part of the course (300h). In this case the ECTS credits will be 11. See Project in Distributed Global Context (817606S).

Target group:
Master's level students

Prerequisites and co-requisites:
Mandatory: B.Sc. degree or other equivalent degree. Students enrolling directly to the Master's programme should take the "Project Management Principles (811311A)" course first (autumn semester, 3rd year of B.Sc. studies, period 1) or otherwise master the basics of project work and management as in Pressman, R.S. *Software Engineering: A Practitioner's Approach*, the chapters related to project management.

Recommended or required reading:

  Unique project material provided by the customer of the project and/or material to be collected and studied by the project team.

Assessment methods and criteria:
Professional project management skills will be reported in a project portfolio. Expertise on the topic area will be reported in the seminar report. Seminar presentation will also be evaluated. Assessment criteria will be given at the starting lecture and in the web-based learning environment in detail.

Grading:
Every member of a project team will get the same grade. The grade (scale 1–5) will be based on:

- Project management skills (75%)
- Expertise in topic area (20%)
- Oral presentation (5%)

Person responsible:
Tonja Molin-Juustila

Working life cooperation:
Yes. Learning by doing, i.e. managing authentic, resource-limited project work and integrating the practices of an academic expert into the unique project assignment.

Other information:
This course will be closed from autumn 2013 and it will be replaced with two new courses: Project II 817606S (11 ects) and Project II Seminar 817609S (3 ects). Students, who has started this course January 2013 will still do their course and seminar according to this course description. Students, who will start this course September 2013, enrolled for this course during summer 2013, will actually do the two new courses. Please, study the descriptions of the two new courses. You will find them by clicking "search courses" (not "search for instructions and examinations").

813621S: Research Methods, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Tero Vartiainen

Opintokohteen kielet: English

Leikkaavuudet:

   521146S   Research Methods in Computer Science   5.0 op

ECTS Credits:
5 ECTS credits/134 hours of work

Language of instruction:
English

Timing:
The course starts in autumn and continues to spring semester (periods 2 and 3). It is recommended that the course is completed during the first year of Master's studies.

Learning outcomes:
Having completed the course, the student is able to explain the general principles of scientific research and the practices of scientific methodology. The student is also able to generate research problems in information systems and software engineering. The student is able to identify and describe the main research approaches and methods in information systems and software engineering and choose the appropriate approach and method for a research problem. The student is also able to evaluate the methodological quality of a research publication. After the course the student is able to choose and apply the proper approach and method for his or her Master's thesis and find more information on the method from scientific literature.

Contents:
Introduction to general scientific principles, scientific research practices and quality of scientific publications, qualitative research approaches and selected research methods, quantitative research approaches and selected research methods, design science research and selected methods, requirements and examples of Master's theses, evaluation of research.

Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
Lectures 40h, exercises 30h and individual work 64h. Learning diary is written about the lectures and exercises. Exercises include group work.

Target group:

Prerequisites and co-requisites:
Completion of Bachelor's studies

Recommended optional programme components:

Recommended or required reading:
Lecture slides and specified literature

Assessment methods and criteria:
Accepted learning diary

Grading:
Pass/fail

Person responsible:
Tero Vartiainen

Working life cooperation:
No

815308A: Embedded Software Development Environments, 4 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Henrik Hedberg

Opintokohteen kielet: English

Leikkaavuudet:

811359A   Mobile Systems Programming   6.0 op

811359A-01   Programming mobile devices, exercise work   0.0 op

811359A-02   Programming mobile devices, exam   0.0 op

ECTS Credits:
4 ECTS credits/108 hours of work

Language of instruction:
  English
Timing:
1 st year of Master's and GS ^{3}D studies, spring semester, period 4

Learning outcomes:
After completing the course, a student is able to work with the essential software development tools of a selected embedded platform. The student is able to implement memory and power efficient applications by exploiting existing libraries and knowledge of the programming interfaces provided by the platform.
Contents:
The focus of the course is in the software development environments and tools for embedded platforms, such as Android, iOS, Windows Phone and PIC32. In addition, the course covers memory and power management, the core services of the platform, and the utilisation of existing libraries, such as Qt. One platform will be selected for deeper study, and the course introduces its essential software development tools and libraries. The emphasis is on application development for the platform as an exercise.
Mode of delivery:
Blended teaching

Learning activities and teaching methods:
Lectures and exercises about 40h, exercise work 68h

Target group:

Prerequisites and co-requisites:
Course "815309A Real-time Distributed Software Development", C/C++ and/or Java programming skills or similar knowledge obtained from other courses.
Recommended optional programme components:

Recommended or required reading:
Course material, the documentation of selected technologies, and other related literature
Assessment methods and criteria:
Assessment methods: Exercise work
Grading:
Grading: 1–5
Person responsible:
Responsible person: Henrik Hedberg
Working life cooperation:
No

815653S: Open Source Software Development, 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Henrik Hedberg

Opintokohteen kielet: English

ECTS Credits:
4 ECTS credits/108 hours of work

Language of instruction:
English
Timing:
2 ^nd^ year of Master's studies, autumn semester, periods 1 + 2

Learning outcomes:
After completing the course, a student is able to:

- Define the historical background and the ideology of OSS;
- Participate in an OSS development project;
- Evaluate the impact of using OSS and OSS licenses in software development and exploitation;
- View the phenomenon through essential scientific research.

Contents:
Open Source Software (OSS) is one of the most topical phenomena in software development. It affects both software production and the decisions of user organisations. OSS can be studied from different social, legal, economical, software engineering and data security viewpoints. The course covers the range of scientific findings on the OSS paradigm. The course introduces the Open Source Software (OSS) development paradigm and current topics in OSS research. The aim is to study from different viewpoints, for example, what OSS is and what it is not, the history and organisation of OSS projects, methods of OSS development and usage, as well as licensing models and possible risks. The emphasis is on research work.
Mode of delivery:
Mostly face-to-face teaching but some parts are implemented as distance teaching
Learning activities and teaching methods:
Lectures and seminars about 40h, exercises about 10h, seminar paper about 58h.
Prerequisites and co-requisites:
Compulsory prerequisites are bachelor degree or other equivalent degree and basic knowledge of software engineering and research work. The course allows passing Project II following the OSS development principles or a Master's thesis on an OSS topic.
Recommended optional programme components:

Recommended or required reading:
Fogel, K. (2005): Producing Open Source Software - How to Run a Successful Free Software Project, O'Reilly Media;
Rosen L. (2004): Open Source Licensing: Software Freedom and Intellectual Property Law, Prentice Hall;
international articles covering the topic.
Assessment methods and criteria:
Active participation and a seminar paper
Grading:
1-5
Person responsible:
Henrik Hedberg
Working life cooperation:
No

815309A: Real Time Distributed Software Development, 6 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Petri Pulli

Opintokohteen kielet: English

ECTS Credits:
6 ECTS credits/160 hours of work
Language of instruction:
 English
Timing:
1 st year of Master's studies, autumn semester, periods 1 + 2
Learning outcomes:
After completing the course, the student:

• Is able to analyse the characteristics of real-time distributed systems;
• Is able to acquire an object-oriented, model-based approach to solve the design problems found in real-time systems;
• Is able to detect and derive specific problems facing the real-time software designer, and to suggest design patterns to solve those problems.

Contents:
Introduction
1. Characteristics of real-time systems;
2. Resource management;
3. Safety and reliability;
4. Time constraints;
5. Concurrency;
6. Scheduling;
7. Multitasking, interrupts;
8. Hardware interfaces.
Characteristics of Distribution
1. Centralised;
2. Client-server;
3. Clusters ;
4. Cloud;
5. Peer-to-peer;
6. Ad hoc;
7. Concept of time;
8. Synchronisation;
9. Latency and jitter;
10. Quality of service;
11. Service discovery;
12. Networking primitives;
13. Networking platforms.

Real-Time UML Modelling Methodology
Real-Time Design Patterns
Design Examples: Embedded, Ubiquitous, Mobile, Web/Internet
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 45h, design exercises 15h, student projects 100h.
Target group:

Prerequisites and co-requisites:
Student understands computer architecture, object-oriented analysis and design (UML), programming language C and/or Java.
Recommended optional programme components:

Recommended or required reading:
Lecture notes based on reference books
• Douglass B.P. (2007) Real-Time UML – Advances in the UML for Real-Time Sys-tems. Third edition. Addison-Wesley ISBN 0-321-16076-2. 694 p.
• Douglass B.P. (2009) Real-Time Design Patterns – Robust Scalable Architecture for Real-Time Systems. Addison-Wesley ISBN 0-201-69956-7. 500 p.
Assessment methods and criteria:
Exam and project evaluation.
Grading:

1–5

Person responsible:
Petri Pulli
Working life cooperation:
No

817602S: Software Development in Global Environment, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Similä, Jouni Kalervo

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits/134 hours of work.

Language of instruction:
English
Timing:
1 st year of Master's studies; 2012 spring semester, period 4; 2012 fall semester, period 1; in the following years the course will be implemented during the fall semester

Learning outcomes:
After completing the course, the student

- Can define the key success factors of the GSD and the potential problems in coordination of projects where teams are separated by physical and/or temporal distance;
- Can define and evaluate the collaborative technologies, which in the best way support distributed software development;
- Can choose the methods and tools for distributed software development;
- Can apply the practices of GSD in a student project and use the supporting tools throughout the project life cycle.

Contents:
Some of the topics covered are strategic issues in distributed development (off-shoring, near-shoring, outsourcing, OSS); cost-benefit-risk analysis; the triad of coordination, control and communication; team building (e.g. virtual teams); software process paradigms in the global environment (planned, agile); methods and tools for distributed software development; issues related to allocation of tasks; communication issues that arise due to distance and time zone differences; infrastructure support; geographical dispersion; lack of information communication; coordination complexity; cultural issues; technical issues related to information and artefact sharing; architectural design; and finally knowledge management issues. The lectures and seminars also review current research aspects of the GSD and related teaching case studies from industry. The exercises demonstrate distributed software development as a virtual team with the support of appropriate methods and tools.
Mode of delivery:
Face-to-face lectures and seminars with all the students. Lecture assignments (article presentations and acting as opponents) for groups of 4 students. Study groups with groups of 8 students using case-based teaching method. Communication between exercise groups is done over the internet.

Learning activities and teaching methods:
Lectures and seminars involving all the students 30h and 30 h of reading (in English), study groups involving 8 students 20h, and exercises 50h. During the seminars a team of 4 students will present a selected research article and another team of 4 students will act as opponents. In the study groups a relevant teaching case from industry is discussed with the students. Each student will prepare a written analysis of the case before the discussion and a reflective analysis after the discussion. The exercises include laboratory demonstrations of different supporting tools for distributed software development. The students train in project software development and planning practices in a distributed environment. The student project groups are organised into virtual (distributed) teams of 4 students.

Target group:

Recommended or required reading:
To be announced during the course implementation.
Assessment methods and criteria:
By active participation or alternatively exam, based on the course study materials.
Grading:
1–5, active participation: lectures (20%), lecture assignments (30%), study groups (10%), exercises (40%).

Person responsible:
Jouni Similä
Working life cooperation:
No
Other information:
Participation: The course is obligatory for GS ³D students and software engineering students; the total number of students is limited according to the departmental selection rule (valintasääntö, kts. Opinto-opas). 80% attendance is required. Web page **:** http://www.tol.oulu.fi/index.php?id=1125

815660S: Software Engineering Management, Measurement and Improvement, 4 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Ayse Tosun Misirli

Opintokohteen kielet: English

ECTS Credits:
4 ECTS credits/108 hours of work

Language of instruction:
English
Timing:
2 nd year of Master's and GS ³D studies, autumn semester, period 2

Learning outcomes:
After completing the course the student understands the fundamental principles of software processes and their development in professional software engineering. The course extends the quality understanding based on individual techniques (e.g. reviews) so that after completing the course the student is able to:

- Evaluate different methods and techniques;
- Select from them appropriate ones for different software engineering environments;
- Have capabilities to participate in systematic efforts for improvement in software companies.

Contents:
The course covers the most fundamental process centred software quality improvement and management approaches, methods and latest research results, as well as approaches to software measurement. The topics of the course include: traditional waterfall, agile (extreme programming, scrum, rational unified process, crystal, feature driven development, adaptive software development, dynamic systems development method) and lean methods, process improvement approaches, software process and product measurement, agile and lean practices, process improvement at the enterprise level and practical examples from software industry.
Learning activities and teaching methods:
Lectures 18h, study group working 25h, paper reading 25h, seminar 20h, report writing 20h
Target group:

Prerequisites and co-requisites:
B.Sc. or other equivalent degree and basic knowledge of software engineering
Recommended optional programme components:

Recommended or required reading:

- CMMI: Guidelines for Process Integration and Product Improvement. Mary Beth Chrissis, Mike Konrad, Sandy Shrum. Addison-Wesley, ISBN 032-115496-7, 2004.
- Agile Project Management with Scrum. Ken Schwaber, Microsoft Press, ISBN 0-7356-1993-X. 2004.
- Dingsøyr T., Dybå T., Moe N.B., Agile Software Development: Current Research and Future Directions, Springer, 2010
- C. Jones, Applied Software Measurement: Global Analysis of Productivity and Quality, 3rd ed. McGraw-Hill Osborne Media, 2008.
- Craig Larman and Bas Vodde, Scaling Lean & Agile Development: Thinking and Organizational Tools for Large-Scale Scrum, Addison-Wesley, 2009

Assessment methods and criteria:
Active and regular participation to lectures and seminars AND report evaluation AND seminar presentations

Grading:
1–5
Person responsible:
Ayse Tosun Misirli
Working life cooperation:
No

815661S: Software Engineering Research, 7 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

ECTS Credits:

7 ECTS credits/187 hours of work

Language of instruction:
English
Timing:
2 nd year of Master's studies, autumn semester, period 1+2

Learning outcomes:
After completing the course the student will know the current research areas in software engineering and the most important software engineering research methods. The student understands academic research and publishing in software engineering, and is able to critically analyse scientific articles from the viewpoint of the content and research methods used in the article. The student is able to present academic research and actively participate in an academic discussion of research papers and research results.

Contents:
Research areas in software engineering, research methods.

Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
Lectures, assignments related to lectures, presentations, report. Lectures and seminars 42h, assignments 105h, report 40h.
Target group:

Prerequisites and co-requisites:
B.Sc. or other equivalent degree
Recommended optional programme components:

Recommended or required reading:

Wohlin C., Runeson P., Höst M., Ohlsson M., Regnell B., Wesslen A., Experimentation in Software Engineering, Kluwer Academic Publishers, 2000, lecture material, software engineering scientific literature.

Assessment methods and criteria:
Assignments related to lectures, report. There is no final exam.
Grading:
1–5
Person responsible:
Ayse Tosun Misirli
Working life cooperation:
No
Other information:
Course material can be found at Optima.

815310A: Software Production and Maintenance, 4 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Saukkonen, Samuli

Opintokohteen kielet: English

ECTS Credits:
4 ECTS credits/108 hours of work
Language of instruction:
English
Timing:
1st year of Master's and GS3D studies, spring semester, period 3

Learning outcomes:
After completing the course, the student:

- Can apply the framework of product line engineering in large scale software production;
- Can apply the maintenance process and techniques in software production.

Contents:
Product line engineering
1. Product line variability;
2. Domain engineering;
3. Application engineering;
4. Transition strategies and organisational issues.
Software maintenance
1. Categories of maintenance;
2. Corrective maintenance;
3. Other forms of maintenance.

Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 20h, study group working and weekly discussion sessions with the teacher on 8 assignments, together with report writing, 88h.
Target group:

Prerequisites and co-requisites:
Basic knowledge of software engineering and software architectures.

Recommended optional programme components:

Recommended or required reading:
- Pohl, K., Böckle, G., van der Linden, F. Software Product Line Engineering. Foundations, Principles, and Techniques, Springer-Verlag, 2005; chapters 1-5, 10, 15, 19-20.
- Chastek G.J., Donohoe P., McGregor J.D., Formulation of a Production Strategy for a Software Product Line, Technical Note CMU/SEI-2009-TN-025, Carnegie Mellon, 2009
- Gopalaswamy, R., Ramesh, B., Software maintenance: effective practices for geographically distributed environments, Tata McGraw-Hill, 2006 - Computers - 456 pages; chapters 1-6.

Assessment methods and criteria:
Active participation: 8 weekly assignments to be assessed separately. The final grade will be the sum of all assignments. "Conventional" participation: written exam.

Grading:
1–5
Person responsible:
Samuli Saukkonen
Working life cooperation:
No

815311A: Software Quality and Testing, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Leikkaavuudet:

ay815311A   Software Quality and Testing (OPEN UNI)   5.0 op

ECTS Credits:
5 ECTS credits/134 hours of work
Language of instruction:
English
Timing:
1 st year of Master's studies, autumn semester, period 1
Learning outcomes:
The student understands different views on software quality and the role of reviews, inspection and testing as a part of software engineering and defect removal techniques. The student can conduct the review as part of review team and use an appropriate supporting tool. The student knows testing levels, strategies and techniques, can create test cases and conduct unit testing with appropriate testing tools. The student knows the possibilities of test driven development, test automation and models for reviewing.
Contents:
Software quality and quality assurance. Software reviews and inspection. Fundamental concepts of software testing. Software testing techniques. Test-driven development. Test automation.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 32h, study group working 24h, paper reading 24h, exercises 24h, report writing 30 h
Target group:

Prerequisites and co-requisites:
Basic knowledge of software engineering, knowledge of Java programming language.
Recommended optional programme components:

Recommended or required reading:
To be announced during the course implementation but initially planned to be:
- Pezze M.,Young M., "Software Testing and Analysis: Process, Principles and Tech-niques", John Wiley&Sons, 2008
- A. P. Mathur, "Foundations of Software Testing", Prentice Hall, 2008
- Paul Ammann, Jeff Offutt, "Introduction to Software Testing", Cambridge University Press, 2008

- Kent Beck, "Test-Driven Development by Example", Addison-Wesley, 2002
- Lasse Koskela, "Test Driven: Practical TDD and Acceptance TDD for Java Devel-opers", Manning Publications, 2007
- Galin D., "Software Quality Assurance: From theory to implementation", Addison-Wesley, 2004

Assessment methods and criteria:
Report and exercise evaluation, active and regular attendance to lectures and exercises.
Grading:
1–5
Person responsible:
 Ayse Tosun Misirli
Working life cooperation:
No

813619S: Emerging Technologies and Issues, 4 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Oinas-Kukkonen, Harri Ilmari

Opintokohteen kielet: English

ECTS Credits:
4 ECTS credits/108 hours of work
Language of instruction:
English
Timing:
1st year of Master's and GS3D studies, spring semester, period 3
Learning outcomes:
After completing the course, the student is able to:

- Analyse the on-going changes in consumer behaviour, customer requirements, ICT markets and technological development;
- Evaluate key enabling web technologies and become an effective participant in web-enabled business endeavours and initiatives;
- Design ways of leveraging the technology to improve intra- and inter-organisational processes and enhance a firm's competitive position;
- Develop his/her skills for building careers and taking advantage of entrepreneurial opportunities through emerging technologies; and
- Categorise and compare factors that influence how relevant an emerging technol-ogy will be in the long run.

Contents:
1. Development trends of the ICT industry and technology convergence, in particular related to the World Wide Web.
2. What are emerging technologies; what has their economic and other impact been to date; what is their potential impact; projections of future impact?
3. The creation and transformation of goods and services through emerging technolo-gies (service science) and their impact on organisations, markets, industries and society.
4. How is the web reshaping business and how can business leverage emerging tech-nologies?
5. Search for innovations.
6. Understand concepts of business intelligence, market analysis, technology road mapping and scenarios.
7. Future forecasting and research methods and theories of technological innovation and diffusion.
8. Technological Trends: What innovations in the emerging technologies can we ex-pect in the near future?
Selected information technology trends: cloud computing, social media system, crowdsourcing, Web 3.0, etc.

Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
27h lectures, 81h independent work.

Target group:

Prerequisites and co-requisites:
None
Recommended optional programme components:

Recommended or required reading:
Refer to the course web pages

Assessment methods and criteria:
Exam
Grading:
Grading: 1–5
Person responsible:
Harri Oinas-Kukkonen
Working life cooperation:
No

812350A: Enterprise Systems, 4 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Li Zhao

Opintokohteen kielet: English

ECTS Credits:
4 ECTS credits/108 hours of work
Language of instruction:
English
Timing:
1st year of Master's and GS3D studies, spring semester, period 4

Learning outcomes:
After completing the course, the student:

• Is able to evaluate the processes used in a competitive environment;
• Is able to describe how processes integrate the internal functions of the firm and al-low the firm to interact with its environment;
• Is able to recognise, model, and improve processes to achieve efficiency and com-pliance objectives;
• Understands the role of ERP, SCM, and CRM systems etc. as components of the enterprise architecture;
• Understands process development and lifecycle management;
• Is able to explain the impact of automation on work practices.

Contents:
1. A strategic view of processes; concepts of organisational efficiency and effective-ness;
2. Integrating the functional areas of the organisation;
3. Relating processes to the financial, customer, and product-oriented goals of the firm;
4. Supply chain management (SCM);
5. Customer relationship management CRM);
6. Enterprise management systems (ERP);
7. Collaborative systems;
8. Knowledge management systems.

Learning activities and teaching methods:
The overall workload for each student in this course is 108 hours. The distribution of this 105-hour workload amongst the different parts of the course will be announced on the course webpage before the course starts.

Target group:

Prerequisites and co-requisites:
Understanding of the software business, business process modelling, legacy information systems and basics of accounting helps.

Recommended optional programme components:

Recommended or required reading:
Refer to the course webpages
Assessment methods and criteria:
Participation in lectures/exercises/seminars, course assignments, exam.
Grading:

  1–5
Person responsible:
Marjo Tiikkaja
Working life cooperation:
No

817604S: ICT and Organizational Change, 5 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Carl Lawrence

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits/134 hours of work
Language of instruction:
English
Timing:
2nd year, spring semester, periods 2+3
Learning outcomes:
After completing the course the student is:

* Able to distinguish various levels of organisational activities and their relations;
* Able to discuss about the role of information technology in various levels of change of organisation and its context;
* Able to analyse ICT-based organizational change process.
Contents:
The course studies organisations at four levels: individuals, practices, organizational structures and transformations, and the societal context of organisations. The organizational role of ICT and the relation between ICT and knowledge are also discussed. A method for analysing organisations as networks of activity systems is presented. The role of power, trust and control in the change process is discussed. The different aspects of change agents are presented and analysed.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Introductory lectures 20h, seminar sessions 14h, individual work 100h (for a review and analysis of selected course materials and making a presentation for the seminar).
Prerequisites and co-requisites:
B.Sc. or other equivalent degree and course Information Systems in Organisations (812304A) or equivalent knowledge.

Recommended optional programme components:

Recommended or required reading:
A list of research articles will be provided for the lectures and assignments. Readings for the background and theoretical framework are:
* Gareth R. Jones (2010) Organizational Theory, Design, and Change: Global Edition (6. Ed.) Chapters 1-3, 10-12,

Prentice Hall.
- K. Kuutti (1996) Activity Theory as a potential framework for human-computer inter-action research, in Context and Consciousness: Activity Theory and Human Com-puter Interaction, B. Nardi, Editor. 1996, MIT Press: Cambridge. p. 17-44.
- Frank Blackler (1995) Knowledge, knowledge work and organizations: an overview and interpretation. Organization studies, 1995. Pp. 1021-1046
- Frank Blackler et al. (2000) Organizing Processes in Complex Activity Networks. Organization, vol. 7 no. 2. Pp. 277-300.

Assessment methods and criteria:
Lecture and seminar participation, assignment (literature review, analysis, seminar presentation). Alternatively by examination and personal assignment report.
Grading:
1-5
Person responsible:
Kari Kuutti
Working life cooperation:
No

812349A: IT Infrastructure, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits/134 hours of work

Language of instruction:
English
Timing:
1st year of Master's studies, spring semester, period 1

Learning outcomes:
After completing the course, students are able to judge, compare and apply data communications concepts to various situations encountered in industry; identify general concepts and techniques of data communications; explain the technology of the Internet; identify the most important server and storage architectures and the main mechanisms for providing high-capacity processing and storage capacity; and explain the regulatory environ-ment.
Contents:
1. Introduction to large-scale computing applications;
2. Network requirements and architecture;
3. Standards and standards bodies;
4. Network services and Middleware;
5. Internet services, protocols and technologies;
6. Underlying network technologies;
7. Performance monitoring, fault detection, recovery and restoration;
8. Next-generation network infrastructure, industry technology directions.
Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
Lectures (24 h), student project work (90 h) and examination (20 h).
Target group:

Prerequisites and co-requisites:
Student is familiar with basic computer architecture and the Internet.
Recommended optional programme components:

Recommended or required reading:

- Lecture notes;
- Supplementary technical and scientific articles;
- Phil Simon (2010) The next wave of technologies: opportunities from chaos. Wiley. ISBN 0-47-058750-4.

Reference books:
- Comer, D.E. (2009) Computer Networks and Internets. 5th edition. Pearson ISBN 0-13-504583-5. 600 p.
- Kurose J.F., Ross K.W. (2010) Computer Networking – A Top-Down Approach. 5th edition. Pearson ISBN 0-13-136548-7. 888 p.
- Travostino F., Mambretti J., Karmous-Edwards G. (2006) Grid Networks – Enabling grids with advanced communication technology. Wiley ISBN 0-470-01748-1. 340 p.

Assessment methods and criteria:
Individual project work, examination
Grading:
 1–5
Person responsible:
 Antti Juustila
Working life cooperation:
No

813623S: Information Security Policy and Management in Organisations, 5 op

Voimassaolo: 01.08.1950 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Mikko Siponen

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits/134 hours of work
Language of instruction:
English
Timing:
2nd year of Master's and GS3D studies, autumn semester, period 1

Learning outcomes:
After completing the course, the student is able to:

- Develop BPC;
- Develop organisation specific information security policies and sub-policy systems in organisations;
- Improve employees' compliance with the information security procedures through training, campaigning and other measures;
- Carry out risk management in practice;
- Estimate the economical investment in information security;
- Understand the strengths and weaknesses of information security management stan-dards;
- Understand the certifications in the area of information security management;
- Design information security policies at organisations.
Contents:
1.   BCP;
2.   Development of organisation specific information security policies and sub-policy systems at organisations;
3.   Measuring employees' compliance with information security policies;
4.   Improving employees' compliance with the information security procedures through training, campaigning and other means;
5.   Information security risk management in practice, estimation of economical investment in information security;
6.   Information security management standards;
7.   Certifications related to information security.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:

Lectures 30h, exercises 18h, student preparation and reading for exercises and examination 86h.
Target group:

Prerequisites and co-requisites:
Bachelor degree or other equivalent degree and course "811168P Introduction to Information Security" or principles of information security, or similar knowledge obtained from other courses.
Recommended optional programme components:

Recommended or required reading:
Articles (to be announced later)
Assessment methods and criteria:
Examination.
Grading:
Grading: 1–5
Person responsible:
Mikko Siponen
Working life cooperation:
No

813624S: Information Systems Theory, 7 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Tero Vartiainen

Opintokohteen kielet: English

ECTS Credits:
7 ECTS credits/187 hours of work
Language of instruction:
 English
Timing:
2nd year of Master's studies, autumn semester, periods 1 + 2

Learning outcomes:
: After completing the course, the student:

•   Will have a good knowledge and understanding of a broad array of research topics and themes within the field of information systems;
•   Will have good knowledge and understanding of information systems research and the process by which that research is produced;
•   Can publish critical IS research articles in some of the leading academic journals and conference proceedings;
•   Can critically analyse and synthesise academic sources;
•   Can verbally present arguments in an academic fashion;
•   Can write a literature review on an IS research topic.
Contents:
1.   Information Systems Research Overview
2.   A contemporary selection of IS research themes, such as:
•   Information systems success and failure;
•   Information systems development;
•   Understanding the end-user;
•   Risk management;
•   Cultural Issues in information systems.

Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 1.5 ECTS credits (40.5h), class preparation 1.5 ECTS (40.5h), and exercises 4 ECTS (107h).

Target group:
Master's level students
Prerequisites and co-requisites:
Bachelor degree or other equivalent degree and "Research Methods" course (813621S). 813624S is a substantive overview of research in information systems, not a methods course, and students should be familiar with research methods prior to enrolling in 813624S.
Recommended optional programme components:

Recommended or required reading:
To be announced during the course implementation
Assessment methods and criteria:
Class Preparation:
Paper summaries   15%
Class Discussion   15%
Class Quizzes   15%

Exercises:
Research Proposal One   2.5%
Essay Assignment One   25%

Research Proposal Two   2.5%
Essay Assignment Two   25%

Note that there is no final exam.

Grading:
1–5
Person responsible:
Tuure Tuunanen
Working life cooperation:
No
Other information:
Course material can be found at OPTIMA e-learning environment, Urkund is used for course work submissions.

812335A: Interaction Design, 4 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Kuutti, Kari Pekka Tapani

Opintokohteen kielet: English

ECTS Credits:
4 ECTS credits/108 hours of work
Language of instruction:
English
Timing:
1st year of Master's studies, autumn semester period 2
Learning outcomes:
The course explains the role of human interaction with products and services, explains the factors and problems related to it to motivate interaction design, and teaches some methods for analysis, evaluation and design of interactions.
After completing the course, the student can assess the role of human interaction with information technological products or services and identify factors and problems related to it in a practical design case. The student is able to:
- use methods for analysis and evaluation of existing interfaces;
- understand the role of requirements, plan and conduct a simple requirements collection and analysis;
- use basic principles of usability for graphical user interface design;
- use interaction design methods to create a novel or redesigned interactive product.
Contents:

The first part provides an overview of interaction design, introducing the key issues and activities of the subject: the terminology and fundamental concepts of the area; the main activities involved in interaction design, and the importance of user involvement in the design process. Part two addresses the key activity in interaction design: establishing requirements for an interactive product and focusing on making the product usable for the intended population. The third part covers the techniques and knowledge necessary to design an interactive product that is accessible and useful to the people who are expected to use it. Part four presents the techniques and knowledge necessary to design and evaluate an interactive product.

Mode of delivery:
Face-to-face teaching / blended teaching
Learning activities and teaching methods:
Lectures 20h, assignments and tutoring or one larger assignment and representation 55h, and exam preparation and exam 33h
Target group:
Master's level students of the IS Oriented Module (compulsory), Master's level students of the SE Oriented Module (optional) and GS3D students (optional)
Prerequisites and co-requisites:
Basic knowledge on human-computer interaction with usability and user-centered design
Recommended optional programme components:

Recommended or required reading:
Sharp, Rogers and Preece (2007, 2nd edition or later edition) Interaction Design: Beyond Human-Computer Interaction
Assessment methods and criteria:
Exam 50%, assignment 50%
Grading:
1-5
Person responsible:
 Kari Kuutti / Anna-Liisa Syrjänen
Working life cooperation:
No

817603S: System Design Methods for Information Systems, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Li Zhao

Opintokohteen kielet: English

ECTS Credits:
5 credits/134 hours of work

Language of instruction:
English
Timing:
1st year of Master's and GS3D studies, autumn semester, period 1

Learning outcomes:
After completing the course, students will be able to describe the defects inherent in the traditional waterfall model and explain how other methods aim to answer its defects, and other challenges in information systems development (ISD). In particular, students will be able to use and apply socio-technical methods like SSM and ETHICS and their underlying techniques in re-planning and developing the sub-systems (automated and non-automated) and work-flows in an organization. Students will also learn how to analyse the differences and similarities of philosophies underlying ISD methods. This will give students the ability to compare methods with each other, assess and give arguments for a decision as to which method is suitable for an ISD project in an organization. In addition, students will be able to describe the issues relating to the management of global information systems.

Contents:

What is information systems development (ISD) and waterfall method, socio-technical methods like SSM and ETHICS, miscellaneous methods or frameworks like Agile, ISAC, PRINCE2, business process re-engineering, rapid application development, evolutionary approach. Managing global systems.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 20h, exercises 24h, homework 30h, essay 30h, examination 30h.
Target group:

Prerequisites and co-requisites:
Bachelor studies recommended

Recommended optional programme components:

Recommended or required reading:
Avison, D., Fitzgerald, G. (2006) Information Systems Development, methodologies, techniques & tools. 4th Edition. London: McGraw-Hill; Laudon, K.C., Laudon, J.P. (2010) Management Information Systems, Managing the Digital Firm. 11th Edition. Upper Saddle River, New Jersey: Pearson Education. Chapter 15: Managing Global Systems.
Assessment methods and criteria:
Examination, accepted essay, accepted exercise assignments
Grading:
1-5
Person responsible:
Tero Vartiainen
Working life cooperation:
No

812650S: Advanced Topics in Human-Centred Design, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Kuutti, Kari Pekka Tapani

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits/134 hours of work
Language of instruction:
 English
Timing:
1 st – 2 nd year of Master's studies, autumn semester, period 1

Learning outcomes:
After completing the course, students can evaluate the usefulness and efficiency of various specific methods and frameworks used in human-centred design, and they can use a specific framework or method to collect data and analyse it to provide novel information for design.
Contents:
The content of the course will change with time. The initial set of topics includes:
- The role of field studies in human-centred design;
- Post-cognitivist theories of interaction;
- Information ecologies and infrastructures;
- User experience as an object of analysis and design;
  - Participatory design, end-user design and living labs.
Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
Lectures 20h, assignments 100h, seminars 14h

Target group:

Prerequisites and co-requisites:
Course "812335A Interaction Design" or similar knowledge.

Recommended optional programme components:

Recommended or required reading:
A collection of research papers supported with lecture materials. Students may also need to collect some study material by themselves.

Assessment methods and criteria:
Depending on the implementation group and/or individual assignments, evaluated according predefined evaluation criteria and in some implementations a participation activity may also be important.

Grading:
  1–5

Person responsible:
  Kari Kuutti

Working life cooperation:
No

817608S: Digital Service Innovation and Design, 5 op

Voimassaolo: 01.01.2012 - 30.11.2012

Opiskelumuoto: Advanced Studies

Laji: Course

Arvostelu: 1 - 5, pass, fail

Opettajat: Tuure Tuunanen

Opintokohteen kielet: Finnish

ECTS Credits:
5 ECTS credits/134 hours of work

Language of instruction:
English

Timing:
1 st and 2 nd year of Master's studies, spring semester, period 4

Learning outcomes:
After completing the course, the student:

- Will have good knowledge and understanding of research in the area of digital service innovation, co-creation, development, and design;
- Can acquire knowledge and read critically relevant research articles in some of the leading academic journals and conference proceedings;
- Can apply conceptual digital service development and design models and methods in practice;
- Can produce a digital service specification and a project plan for development;
- Can verbally present a business plan to a potential venture capital investor.

Contents:
1. Digital Service Innovation and Design Overview
2. A contemporary selection of research themes, such as:
- Service-dominant logic for digital services;
- Service modularity and digital services;
- Business models for digital services;
- Digital service development;
- Discovering digital service needs;
- Digital service modelling;
- Digital service co-creation.

Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
Lectures 1.5 ECTS credits (40.5h), class preparation 1 ECTS (26.7h), exercises 1.5 ECTS (40.5h), and final exam preparation 1 ECTS (26.7 h).

Recommended or required reading:
To be announced during the course implementation

Assessment methods and criteria:
Class Preparation:
Class Quizzes   15%

Exercises:
Group project Deliverable &   20%
Presentation
Individual Assignment   15%

Final Exam   50%

Grading:
1-5
Person responsible:
Tuure Tuunanen
Working life cooperation:
No
Other information:
Course material can be found at OPTIMA e-learning environment.

817610S: Doing Software Business in China, 5 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Xiaosong Zheng

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits/134 hours of work
Language of instruction:
English
Timing:
1 st – 2 nd year, spring semester, period 4

Learning outcomes:
After completion of the course, students will have a comprehensive understanding of software as a business and an industry in China. Students will recognise success factors, business models and development trends of the software business in China. Students will also understand the special characteristics of the software business in China.
Contents:
In the course a number of software business topics will be covered and these include: the current software market in China; software products and services in China; internationalisation and globalisation; revenue generation concepts; business planning in China; financing, pricing, cost and profitability; offer calculation; software engineering processes, and business project and entrepreneurship in China.

Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 20h, assignment 60h, and exam 54. In the lectures much of the time will be devoted to discussing specific topics in small groups and among the class as a whole. In addition, case studies, home assignments and in-class presentation will be used. For the home assignment students are required to form a group (2 students per group) to complete a written report on a specific software business topic.
Recommended or required reading:
There is no prescribed textbook for this course. Instead, a reading brick comprising lecture notes, book chapters, journal articles and case studies relating to the various topics being covered will be made available for downloading.

Assessment methods and criteria:
1) Exam (50%), 2) home assignment and in-class presentation (50%).
Grading:
1-5
Person responsible:
Xiaosong Zheng
Working life cooperation:
No

815308A: Embedded Software Development Environments, 4 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Henrik Hedberg

Opintokohteen kielet: English

Leikkaavuudet:

811359A   Mobile Systems Programming   6.0 op

811359A-01   Programming mobile devices, exercise work   0.0 op

811359A-02   Programming mobile devices, exam   0.0 op

ECTS Credits:
4 ECTS credits/108 hours of work

Language of instruction:
 English
Timing:
1 st year of Master's and GS 3D studies, spring semester, period 4

Learning outcomes:
After completing the course, a student is able to work with the essential software development tools of a selected embedded platform. The student is able to implement memory and power efficient applications by exploiting existing libraries and knowledge of the programming interfaces provided by the platform.
Contents:
The focus of the course is in the software development environments and tools for embedded platforms, such as Android, iOS, Windows Phone and PIC32. In addition, the course covers memory and power management, the core services of the platform, and the utilisation of existing libraries, such as Qt. One platform will be selected for deeper study, and the course introduces its essential software development tools and libraries. The emphasis is on application development for the platform as an exercise.
Mode of delivery:
Blended teaching

Learning activities and teaching methods:
Lectures and exercises about 40h, exercise work 68h

Target group:

Prerequisites and co-requisites:
Course "815309A Real-time Distributed Software Development", C/C++ and/or Java programming skills or similar knowledge obtained from other courses.
Recommended optional programme components:

Recommended or required reading:
Course material, the documentation of selected technologies, and other related literature
Assessment methods and criteria:
Assessment methods: Exercise work
Grading:
Grading: 1–5

Person responsible:
Responsible person: Henrik Hedberg
Working life cooperation:
No

811601S: Emerging Trends in Software Testing, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits/134 hours of work

Language of instruction:
English
Timing:
1 st - 2 nd year of Master's studies, autumn semester, periods 1+2
Learning outcomes:
After completing the course, the student:

* Can analyse different ways to organize and manage software testing (e.g. possibilities of outsourcing and testing in the cloud) in industrial software development;
* Can evaluate the major techniques of agile testing and major approaches in model-based testing;
* Can analyse the possibilities and limitations of test automation in the context of industrial software development.

Contents:
Test organisation and management in industrial software development. Agile testing. Exploratory testing. Model-based testing. Test automation.

Mode of delivery:
Web-based lectures, face-to-face study groups

Learning activities and teaching methods:
Lectures 24h, study group working 40h, paper reading 40h, report writing 30h.
Target group:

Prerequisites and co-requisites:
Basic knowledge of software quality and testing
Recommended optional programme components:

Recommended or required reading:
To be announced during the course implementation but initially planned to be:
* Crispin L., and Gregory J., Agile testing: a practical guide for testers and agile teams, Addison-Wesley, 2009
* Graham D., Fewster M., Experiences of Test Automation: Case Studies of Software Test Automation, Addison-Wesley, 2012
* Dustin E., Garrett T., Gauf B., Implementing Automated Software Testing, Addison-Wesley, 2009
* Utting, M., & Legeard, B., Practical model-based testing: a tools approach, Elsevier, 2007
Assessment methods and criteria:
Report evaluation
Grading:
1–5
Person responsible:
Ilkka Tervonen
Working life cooperation:
No

812651S: ICT and Behaviour Change, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Pasi Karppinen

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits/134 hours of work

Language of instruction:
 English
Timing:
$1^{st} - 2^{nd}$ year of Master's and GS ^{3}D studies, autumn semester, period 2

Learning outcomes:
After completing the course the student is able to:

- Analyse methods and techniques that are used for persuasion;
- Apply these in an ethical manner as design guidelines for developing applications, targeting changes in human behaviour or attitudes.

Contents:
Attitudinal theories from social psychology have been quite extensively applied to the study of user intentions and behaviour. These theories have been developed mostly for predicting user acceptance of information technology rather than for providing systematic analysis and design methods for developing software solutions that aim at attitude or behaviour change. At the same time a growing number of information technology systems and services are being developed for these purposes. This course will focus on persuasive technology. It will address the process of designing and evaluating persuasive systems, the types of content and software functionality in such systems, the underlying assumptions behind these, methods for analysing the persuasion context, and principles for persuasive system design. Positive examples of persuasive systems include motivating knowledge workers to do their work better or safer and embracing citizens for healthy living habits. Negative examples are games that inflict addiction. Both sides of influence will be discussed.

Mode of delivery:
Face-to-face teaching, Twitter
Learning activities and teaching methods:
Lectures 27h, independent work 108h (personal reflections 28h, reading for the lectures 20h, assignment 60h)
Target group:

Prerequisites and co-requisites:
Understanding the roles of humans as users and developers of ICT
Recommended optional programme components:

Recommended or required reading:
Research articles, the web, to be announced more specifically during the course implementation.
Assessment methods and criteria:
Participation in the lectures, personal reflection reports, course assignments.
Grading:
 1–5
Person responsible:
 Harri Oinas-Kukkonen
Working life cooperation:
No

815653S: Open Source Software Development, 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Henrik Hedberg

Opintokohteen kielet: English

ECTS Credits:
4 ECTS credits/108 hours of work

Language of instruction:
English
Timing:
2 nd year of Master's studies, autumn semester, periods 1 + 2

Learning outcomes:
After completing the course, a student is able to:

- Define the historical background and the ideology of OSS;
- Participate in an OSS development project;
- Evaluate the impact of using OSS and OSS licenses in software development and exploitation;
- View the phenomenon through essential scientific research.

Contents:
Open Source Software (OSS) is one of the most topical phenomena in software development. It affects both software production and the decisions of user organisations. OSS can be studied from different social, legal, economical, software engineering and data security viewpoints. The course covers the range of scientific findings on the OSS paradigm. The course introduces the Open Source Software (OSS) development paradigm and current topics in OSS research. The aim is to study from different viewpoints, for example, what OSS is and what it is not, the history and organisation of OSS projects, methods of OSS development and usage, as well as licensing models and possible risks. The emphasis is on research work.
Mode of delivery:
Mostly face-to-face teaching but some parts are implemented as distance teaching
Learning activities and teaching methods:
Lectures and seminars about 40h, exercises about 10h, seminar paper about 58h.
Prerequisites and co-requisites:
Compulsory prerequisites are bachelor degree or other equivalent degree and basic knowledge of software engineering and research work. The course allows passing Project II following the OSS development principles or a Master's thesis on an OSS topic.
Recommended optional programme components:

Recommended or required reading:
Fogel, K. (2005): Producing Open Source Software - How to Run a Successful Free Software Project, O'Reilly Media;
Rosen L. (2004): Open Source Licensing: Software Freedom and Intellectual Property Law, Prentice Hall;
international articles covering the topic.
Assessment methods and criteria:
Active participation and a seminar paper
Grading:
1-5
Person responsible:
Henrik Hedberg
Working life cooperation:
No

815309A: Real Time Distributed Software Development, 6 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Petri Pulli

Opintokohteen kielet: English

ECTS Credits:
6 ECTS credits/160 hours of work
Language of instruction:
 English
Timing:
1 st year of Master's studies, autumn semester, periods 1 + 2
Learning outcomes:
After completing the course, the student:

• Is able to analyse the characteristics of real-time distributed systems;
• Is able to acquire an object-oriented, model-based approach to solve the design problems found in real-time systems;
• Is able to detect and derive specific problems facing the real-time software designer, and to suggest design patterns to solve those problems.

Contents:
Introduction
1. Characteristics of real-time systems;
2. Resource management;
3. Safety and reliability;
4. Time constraints;
5. Concurrency;
6. Scheduling;
7. Multitasking, interrupts;
8. Hardware interfaces.
Characteristics of Distribution
1. Centralised;
2. Client-server;
3. Clusters ;
4. Cloud;
5. Peer-to-peer;
6. Ad hoc;
7. Concept of time;
8. Synchronisation;
9. Latency and jitter;
10. Quality of service;
11. Service discovery;
12. Networking primitives;
13. Networking platforms.

Real-Time UML Modelling Methodology
Real-Time Design Patterns
Design Examples: Embedded, Ubiquitous, Mobile, Web/Internet
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 45h, design exercises 15h, student projects 100h.
Target group:

Prerequisites and co-requisites:
Student understands computer architecture, object-oriented analysis and design (UML), programming language C and/or Java.
Recommended optional programme components:

Recommended or required reading:
Lecture notes based on reference books
• Douglass B.P. (2007) Real-Time UML – Advances in the UML for Real-Time Sys-tems. Third edition. Addison-Wesley ISBN 0-321-16076-2. 694 p.

- Douglass B.P. (2009) Real-Time Design Patterns – Robust Scalable Architecture for Real-Time Systems. Addison-Wesley ISBN 0-201-69956-7. 500 p.

Assessment methods and criteria:
Exam and project evaluation.
Grading:
 1–5
Person responsible:
Petri Pulli
Working life cooperation:
No

814340A: Small-Group Tutoring, 3 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Heli Alatalo

Opintokohteen kielet: Finnish

ECTS Credits:
3 ECTS credits/80 hours of work

Language of instruction:
Finnish
Timing:

2 nd – 5 th year, autumn and spring semester, periods 1–4

Learning outcomes:
After passing the course a student (tutor) is able to:

- Draw up a supervision plan for his/her small group;
- Put into effect his/her supervision from the viewpoint of students and based on the given tutor training;
- Receive supervision and guidance experience;
- Take responsibility for his/her own supervision work.

Contents:
1. Group training, occasions and meetings 25h
2. Planning and implementation of small-group tutoring 53h
3. Writing his/her own report diary 2h.

Mode of delivery:
Face-to-face teaching and web-based teaching.
Learning activities and teaching methods:
Lectures, exercises and meetings. Practice as a small-group tutor in co-operation with other tutors, Blanko student organisation, library and own department's study-counsellors. Independent personal work.
Recommended or required reading:
Training materials, forms and own reports.
Assessment methods and criteria:
Active participation in tutor-training, implementing small-group tutoring and drawing up the supervision plan and the report diary.

Grading:
Pass/fail

Person responsible:
Heli Alatalo
Working life cooperation:
No

813630S: Software Business Development, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits/134 hours of work

Language of instruction:
 English
Timing:
The course unit is held in the autumn semester, during period 2. It is recommended to complete the course in the first or second year of Master's studies.

Learning outcomes:
The course provides insights to business development on a business, company and industry level. After completing the course, the student is able to plan how business is being developed over the whole life cycle of the business and company, conduct market and business analyses, identify different sources of financing for business operation, evaluate different strategic business options and select a business model adequate for the present and future situation of the company.
Contents:
The course takes three points of view: company start-up, established business, and software industry. The course introduces the concepts of business idea, business plan, software business models and strategies, and the software value network.

Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
Lectures 24h, exercises 12h, course assignments 78h, exam 20h. The course assignments will be conducted as group work.

Target group:

Prerequisites and co-requisites:
The recommended prerequisite is the completion of the following courses prior to enrolling for the course unit: 811174P Introduction to Software Business, 813316A Business Process Modelling and 813620S Software Business and IT Management.
Recommended or required reading:
Refer to the course web pages

Assessment methods and criteria:
This course unit utilizes continuous assessment. Lectures are for the most part voluntarily, but participation is recommended. The students will write course assignments which will be assessed. In addition, there will be an exam at the end of the course which will be assessed. The assessment of the course unit is based on the learning outcomes of the course unit.

Grading:
 1–5
Person responsible:
 Karin Väyrynen
Working life cooperation:
No

817602S: Software Development in Global Environment, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Similä, Jouni Kalervo

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits/134 hours of work.

Language of instruction:
English
Timing:
1 st year of Master's studies; 2012 spring semester, period 4; 2012 fall semester, period 1; in the following years the course will be implemented during the fall semester

Learning outcomes:
After completing the course, the student

- Can define the key success factors of the GSD and the potential problems in coordination of projects where teams are separated by physical and/or temporal distance;
- Can define and evaluate the collaborative technologies, which in the best way support distributed software development;
- Can choose the methods and tools for distributed software development;
- Can apply the practices of GSD in a student project and use the supporting tools throughout the project life cycle.

Contents:
Some of the topics covered are strategic issues in distributed development (off-shoring, near-shoring, outsourcing, OSS); cost-benefit-risk analysis; the triad of coordination, control and communication; team building (e.g. virtual teams); software process paradigms in the global environment (planned, agile); methods and tools for distributed software development; issues related to allocation of tasks; communication issues that arise due to distance and time zone differences; infrastructure support; geographical dispersion; lack of information communication; coordination complexity; cultural issues; technical issues related to information and artefact sharing; architectural design; and finally knowledge management issues. The lectures and seminars also review current research aspects of the GSD and related teaching case studies from industry. The exercises demonstrate distributed software development as a virtual team with the support of appropriate methods and tools.

Mode of delivery:
Face-to-face lectures and seminars with all the students. Lecture assignments (article presentations and acting as opponents) for groups of 4 students. Study groups with groups of 8 students using case-based teaching method. Communication between exercise groups is done over the internet.

Learning activities and teaching methods:
Lectures and seminars involving all the students 30h and 30 h of reading (in English), study groups involving 8 students 20h, and exercises 50h. During the seminars a team of 4 students will present a selected research article and another team of 4 students will act as opponents. In the study groups a relevant teaching case from industry is discussed with the students. Each student will prepare a written analysis of the case before the discussion and a reflective analysis after the discussion. The exercises include laboratory demonstrations of different supporting tools for distributed software development. The students train in project software development and planning practices in a distributed environment. The student project groups are organised into virtual (distributed) teams of 4 students.

Target group:

Recommended or required reading:
To be announced during the course implementation.
Assessment methods and criteria:
By active participation or alternatively exam, based on the course study materials.
Grading:
1–5, active participation: lectures (20%), lecture assignments (30%), study groups (10%), exercises (40%).

Person responsible:
Jouni Similä
Working life cooperation:
No

Other information:
Participation: The course is obligatory for GS [3]D students and software engineering students; the total number of students is limited according to the departmental selection rule (valintasääntö, kts. Opinto-opas). 80% attendance is required. Web page **:** http://www.tol.oulu.fi/index.php?id=1125

815660S: Software Engineering Management, Measurement and Improvement, 4 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Ayse Tosun Misirli

Opintokohteen kielet: English

ECTS Credits:
4 ECTS credits/108 hours of work

Language of instruction:
English
Timing:
2 [nd] year of Master's and GS [3]D studies, autumn semester, period 2

Learning outcomes:
After completing the course the student understands the fundamental principles of software processes and their development in professional software engineering. The course extends the quality understanding based on individual techniques (e.g. reviews) so that after completing the course the student is able to:

- Evaluate different methods and techniques;
- Select from them appropriate ones for different software engineering environments;
- Have capabilities to participate in systematic efforts for improvement in software companies.

Contents:
The course covers the most fundamental process centred software quality improvement and management approaches, methods and latest research results, as well as approaches to software measurement. The topics of the course include: traditional waterfall, agile (extreme programming, scrum, rational unified process, crystal, feature driven development, adaptive software development, dynamic systems development method) and lean methods, process improvement approaches, software process and product measurement, agile and lean practices, process improvement at the enterprise level and practical examples from software industry.
Learning activities and teaching methods:
Lectures 18h, study group working 25h, paper reading 25h, seminar 20h, report writing 20h
Target group:

Prerequisites and co-requisites:
B.Sc. or other equivalent degree and basic knowledge of software engineering
Recommended optional programme components:

Recommended or required reading:
- CMMI: Guidelines for Process Integration and Product Improvement. Mary Beth Chrissis, Mike Konrad, Sandy Shrum. Addison-Wesley, ISBN 032-115496-7, 2004.
- Agile Project Management with Scrum. Ken Schwaber, Microsoft Press, ISBN 0-7356-1993-X. 2004.
- Dingsøyr T., Dybå T., Moe N.B., Agile Software Development: Current Research and Future Directions, Springer, 2010
- C. Jones, Applied Software Measurement: Global Analysis of Productivity and Quality, 3rd ed. McGraw-Hill Osborne Media, 2008.
- Craig Larman and Bas Vodde, Scaling Lean & Agile Development: Thinking and Organizational Tools for Large-Scale Scrum, Addison-Wesley, 2009

Assessment methods and criteria:
Active and regular participation to lectures and seminars AND report evaluation AND seminar presentations

Grading:
1–5
Person responsible:
Ayse Tosun Misirli
Working life cooperation:
No

815310A: Software Production and Maintenance, 4 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Saukkonen, Samuli

Opintokohteen kielet: English

ECTS Credits:
4 ECTS credits/108 hours of work
Language of instruction:
English
Timing:
1st year of Master's and GS3D studies, spring semester, period 3

Learning outcomes:
After completing the course, the student:

- Can apply the framework of product line engineering in large scale software production;
- Can apply the maintenance process and techniques in software production.

Contents:
Product line engineering
  1. Product line variability;
  2. Domain engineering;
  3. Application engineering;
  4. Transition strategies and organisational issues.
Software maintenance
  1. Categories of maintenance;
  2. Corrective maintenance;
  3. Other forms of maintenance.

Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 20h, study group working and weekly discussion sessions with the teacher on 8 assignments, together with report writing, 88h.
Target group:

Prerequisites and co-requisites:
Basic knowledge of software engineering and software architectures.

Recommended optional programme components:

Recommended or required reading:
- Pohl, K., Böckle, G., van der Linden, F. Software Product Line Engineering. Foundations, Principles, and Techniques, Springer-Verlag, 2005; chapters 1-5, 10, 15, 19-20.
- Chastek G.J., Donohoe P., McGregor J.D., Formulation of a Production Strategy for a Software Product Line, Technical Note CMU/SEI-2009-TN-025, Carnegie Mellon, 2009

- Gopalaswamy, R., Ramesh, B., Software maintenance: effective practices for geographically distributed environments, Tata McGraw-Hill, 2006 - Computers - 456 pages; chapters 1-6.

Assessment methods and criteria:
Active participation: 8 weekly assignments to be assessed separately. The final grade will be the sum of all assignments. "Conventional" participation: written exam.

Grading:
  1–5
Person responsible:
Samuli Saukkonen
Working life cooperation:
No

815311A: Software Quality and Testing, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Leikkaavuudet:

ay815311A   Software Quality and Testing (OPEN UNI)   5.0 op

ECTS Credits:
5 ECTS credits/134 hours of work
Language of instruction:
English
Timing:
 1 st year of Master's studies, autumn semester, period 1
Learning outcomes:
The student understands different views on software quality and the role of reviews, inspection and testing as a part of software engineering and defect removal techniques. The student can conduct the review as part of review team and use an appropriate supporting tool. The student knows testing levels, strategies and techniques, can create test cases and conduct unit testing with appropriate testing tools. The student knows the possibilities of test driven development, test automation and models for reviewing.
Contents:
Software quality and quality assurance. Software reviews and inspection. Fundamental concepts of software testing. Software testing techniques. Test-driven development. Test automation.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 32h, study group working 24h, paper reading 24h, exercises 24h, report writing 30 h
Target group:

Prerequisites and co-requisites:
Basic knowledge of software engineering, knowledge of Java programming language.
Recommended optional programme components:

Recommended or required reading:
To be announced during the course implementation but initially planned to be:
• Pezze M.,Young M., "Software Testing and Analysis: Process, Principles and Tech-niques", John Wiley&Sons, 2008
• A. P. Mathur, "Foundations of Software Testing", Prentice Hall, 2008
• Paul Ammann, Jeff Offutt, "Introduction to Software Testing", Cambridge University Press, 2008
• Kent Beck, "Test-Driven Development by Example", Addison-Wesley, 2002
• Lasse Koskela, "Test Driven: Practical TDD and Acceptance TDD for Java Devel-opers", Manning Publications, 2007
• Galin D., "Software Quality Assurance: From theory to implementation", Addison-Wesley, 2004
Assessment methods and criteria:

Report and exercise evaluation, active and regular attendance to lectures and exercises.
Grading:
1–5
Person responsible:
 Ayse Tosun Misirli
Working life cooperation:
No

812671S: Usability Testing, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Mikko Rajanen

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits/134 hours of work

Language of instruction:
English and Finnish
Timing:
1 st – 2 nd year of Master's studies, spring semester, periods 3 and 4

Learning outcomes:
After completing the course, the student can:

- Design and follow through a usability testing process;
- Design usability test scenarios and tasks;
- Select test subjects;
- Plan and follow through usability tests as laboratory tests or field tests;
- Analyse and report the findings from usability tests.

Contents:
Basic terms and types of usability testing, usability tests process, usability test tasks and scenarios, test subjects, following through a usability test, analysing usability test material, reporting the findings from usability tests.

Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 24h, assignment tutoring 13h, assignment 90h, seminar 7h.
Target group:

Prerequisites and co-requisites:
Student is familiar with most common user interface design terms, design and evaluation methods as in "811379A Introduction to Human-Computer Interactions" course.
Recommended optional programme components:

Recommended or required reading:
Structure and contents of the course are based on:
- Dumas, J. S. & Redish, J. C. (1993): A Practical Guide to Usability Testing. Ablex Publishing Corporation.
- Rubin, J. (1994): Handbook of Usability Testing: How to Plan, Design, and Conduct Effective Tests. Chichester: John Wiley & Sons, Inc.

Assessment methods and criteria:
Assessment of the course is based on the learning outcomes of the course based on the written usability test plan, supervised usability tests, written usability test report and oral seminar presentation

Grading:
 Pass/fail

Person responsible:
Mikko Rajanen
Working life cooperation:
No
Other information:
Work placements: No

812650S: Advanced Topics in Human-Centred Design, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Kuutti, Kari Pekka Tapani

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits/134 hours of work
Language of instruction:
  English
Timing:
1 st – 2 nd year of Master's studies, autumn semester, period 1

Learning outcomes:
After completing the course, students can evaluate the usefulness and efficiency of various specific methods and frameworks used in human-centred design, and they can use a specific framework or method to collect data and analyse it to provide novel information for design.
Contents:
The content of the course will change with time. The initial set of topics includes:
- The role of field studies in human-centred design;
- Post-cognitivist theories of interaction;
- Information ecologies and infrastructures;
- User experience as an object of analysis and design;
  - Participatory design, end-user design and living labs.
Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
Lectures 20h, assignments 100h, seminars 14h

Target group:

Prerequisites and co-requisites:
Course "812335A Interaction Design" or similar knowledge.

Recommended optional programme components:

Recommended or required reading:
A collection of research papers supported with lecture materials. Students may also need to collect some study material by themselves.
Assessment methods and criteria:
Depending on the implementation group and/or individual assignments, evaluated according predefined evaluation criteria and in some implementations a participation activity may also be important.
Grading:
  1–5
Person responsible:
  Kari Kuutti
Working life cooperation:
No

817608S: Digital Service Innovation and Design, 5 op

Voimassaolo: 01.01.2012 - 30.11.2012
Opiskelumuoto: Advanced Studies
Laji: Course
Arvostelu: 1 - 5, pass, fail
Opettajat: Tuure Tuunanen
Opintokohteen kielet: Finnish

ECTS Credits:
5 ECTS credits/134 hours of work

Language of instruction:
English
Timing:
1 st and 2 nd year of Master's studies, spring semester, period 4
Learning outcomes:
After completing the course, the student:

- Will have good knowledge and understanding of research in the area of digital service innovation, co-creation, development, and design;
- Can acquire knowledge and read critically relevant research articles in some of the leading academic journals and conference proceedings;
- Can apply conceptual digital service development and design models and methods in practice;
- Can produce a digital service specification and a project plan for development;
- Can verbally present a business plan to a potential venture capital investor.

Contents:
1. Digital Service Innovation and Design Overview
2. A contemporary selection of research themes, such as:
- Service-dominant logic for digital services;
- Service modularity and digital services;
- Business models for digital services;
- Digital service development;
- Discovering digital service needs;
- Digital service modelling;
- Digital service co-creation.

Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 1.5 ECTS credits (40.5h), class preparation 1 ECTS (26.7h), exercises 1.5 ECTS (40.5h), and final exam preparation 1 ECTS (26.7 h).
Recommended or required reading:
To be announced during the course implementation

Assessment methods and criteria:
Class Preparation:
Class Quizzes   15%

Exercises:
Group project Deliverable &   20%
Presentation
Individual Assignment   15%

Final Exam   50%

Grading:
1-5
Person responsible:
Tuure Tuunanen
Working life cooperation:
No
Other information:

Course material can be found at OPTIMA e-learning environment.

817610S: Doing Software Business in China, 5 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Xiaosong Zheng

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits/134 hours of work
Language of instruction:
English
Timing:
1 st – 2 nd year, spring semester, period 4

Learning outcomes:
After completion of the course, students will have a comprehensive understanding of software as a business and an industry in China. Students will recognise success factors, business models and development trends of the software business in China. Students will also understand the special characteristics of the software business in China.
Contents:
In the course a number of software business topics will be covered and these include: the current software market in China; software products and services in China; internationalisation and globalisation; revenue generation concepts; business planning in China; financing, pricing, cost and profitability; offer calculation; software engineering processes, and business project and entrepreneurship in China.

Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 20h, assignment 60h, and exam 54. In the lectures much of the time will be devoted to discussing specific topics in small groups and among the class as a whole. In addition, case studies, home assignments and in-class presentation will be used. For the home assignment students are required to form a group (2 students per group) to complete a written report on a specific software business topic.
Recommended or required reading:
There is no prescribed textbook for this course. Instead, a reading brick comprising lecture notes, book chapters, journal articles and case studies relating to the various topics being covered will be made available for downloading.
Assessment methods and criteria:
1) Exam (50%), 2) home assignment and in-class presentation (50%).
Grading:
1-5
Person responsible:
Xiaosong Zheng
Working life cooperation:
No

813619S: Emerging Technologies and Issues, 4 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Oinas-Kukkonen, Harri Ilmari

Opintokohteen kielet: English

ECTS Credits:
4 ECTS credits/108 hours of work
Language of instruction:
English
Timing:
1st year of Master's and GS3D studies, spring semester, period 3
Learning outcomes:
After completing the course, the student is able to:

• Analyse the on-going changes in consumer behaviour, customer requirements, ICT markets and technological development;
• Evaluate key enabling web technologies and become an effective participant in web-enabled business endeavours and initiatives;
• Design ways of leveraging the technology to improve intra- and inter-organisational processes and enhance a firm's competitive position;
• Develop his/her skills for building careers and taking advantage of entrepreneurial opportunities through emerging technologies; and
• Categorise and compare factors that influence how relevant an emerging technol-ogy will be in the long run.
Contents:
1. Development trends of the ICT industry and technology convergence, in particular related to the World Wide Web.
2. What are emerging technologies; what has their economic and other impact been to date; what is their potential impact; projections of future impact?
3. The creation and transformation of goods and services through emerging technolo-gies (service science) and their impact on organisations, markets, industries and society.
4. How is the web reshaping business and how can business leverage emerging tech-nologies?
5. Search for innovations.
6. Understand concepts of business intelligence, market analysis, technology road mapping and scenarios.
7. Future forecasting and research methods and theories of technological innovation and diffusion.
8. Technological Trends: What innovations in the emerging technologies can we ex-pect in the near future?
Selected information technology trends: cloud computing, social media system, crowdsourcing, Web 3.0, etc.

Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
27h lectures, 81h independent work.

Target group:

Prerequisites and co-requisites:
None
Recommended optional programme components:

Recommended or required reading:
Refer to the course web pages

Assessment methods and criteria:
Exam
Grading:
Grading: 1–5
Person responsible:
Harri Oinas-Kukkonen
Working life cooperation:
No

811601S: Emerging Trends in Software Testing, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits/134 hours of work

Language of instruction:
 English
Timing:
1 st - 2 nd year of Master's studies, autumn semester, periods 1+2
Learning outcomes:
After completing the course, the student:

* Can analyse different ways to organize and manage software testing (e.g. possibilities of outsourcing and testing in the cloud) in industrial software development;
* Can evaluate the major techniques of agile testing and major approaches in model-based testing;
* Can analyse the possibilities and limitations of test automation in the context of industrial software development.

Contents:
Test organisation and management in industrial software development. Agile testing. Exploratory testing. Model-based testing. Test automation.

Mode of delivery:
Web-based lectures, face-to-face study groups

Learning activities and teaching methods:
Lectures 24h, study group working 40h, paper reading 40h, report writing 30h.
Target group:

Prerequisites and co-requisites:
Basic knowledge of software quality and testing
Recommended optional programme components:

Recommended or required reading:
To be announced during the course implementation but initially planned to be:
* Crispin L., and Gregory J., Agile testing: a practical guide for testers and agile teams, Addison-Wesley, 2009
* Graham D., Fewster M., Experiences of Test Automation: Case Studies of Software Test Automation, Addison-Wesley, 2012
* Dustin E., Garrett T., Gauf B., Implementing Automated Software Testing, Addison-Wesley, 2009
* Utting, M., & Legeard, B., Practical model-based testing: a tools approach, Elsevier, 2007
Assessment methods and criteria:
 Report evaluation
Grading:
 1–5
Person responsible:
 Ilkka Tervonen
Working life cooperation:
No

812350A: Enterprise Systems, 4 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Li Zhao

Opintokohteen kielet: English

ECTS Credits:
4 ECTS credits/108 hours of work

Language of instruction:
English
Timing:
1st year of Master's and GS3D studies, spring semester, period 4

Learning outcomes:
After completing the course, the student:

- Is able to evaluate the processes used in a competitive environment;
- Is able to describe how processes integrate the internal functions of the firm and al-low the firm to interact with its environment;
- Is able to recognise, model, and improve processes to achieve efficiency and com-pliance objectives;
- Understands the role of ERP, SCM, and CRM systems etc. as components of the enterprise architecture;
- Understands process development and lifecycle management;
- Is able to explain the impact of automation on work practices.

Contents:
1. A strategic view of processes; concepts of organisational efficiency and effective-ness;
2. Integrating the functional areas of the organisation;
3. Relating processes to the financial, customer, and product-oriented goals of the firm;
4. Supply chain management (SCM);
5. Customer relationship management CRM);
6. Enterprise management systems (ERP);
7. Collaborative systems;
8. Knowledge management systems.

Learning activities and teaching methods:
The overall workload for each student in this course is 108 hours. The distribution of this 105-hour workload amongst the different parts of the course will be announced on the course webpage before the course starts.

Target group:

Prerequisites and co-requisites:
Understanding of the software business, business process modelling, legacy information systems and basics of accounting helps.

Recommended optional programme components:

Recommended or required reading:
Refer to the course webpages
Assessment methods and criteria:
Participation in lectures/exercises/seminars, course assignments, exam.
Grading:

   1–5
Person responsible:
Marjo Tiikkaja
Working life cooperation:
No

812651S: ICT and Behaviour Change, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Pasi Karppinen

Opintokohteen kielet: English

ECTS Credits:

5 ECTS credits/134 hours of work

Language of instruction:
English
Timing:
1 st – 2 nd year of Master's and GS 3D studies, autumn semester, period 2

Learning outcomes:
After completing the course the student is able to:

- Analyse methods and techniques that are used for persuasion;
- Apply these in an ethical manner as design guidelines for developing applications, targeting changes in human behaviour or attitudes.

Contents:
Attitudinal theories from social psychology have been quite extensively applied to the study of user intentions and behaviour. These theories have been developed mostly for predicting user acceptance of information technology rather than for providing systematic analysis and design methods for developing software solutions that aim at attitude or behaviour change. At the same time a growing number of information technology systems and services are being developed for these purposes. This course will focus on persuasive technology. It will address the process of designing and evaluating persuasive systems, the types of content and software functionality in such systems, the underlying assumptions behind these, methods for analysing the persuasion context, and principles for persuasive system design. Positive examples of persuasive systems include motivating knowledge workers to do their work better or safer and embracing citizens for healthy living habits. Negative examples are games that inflict addiction. Both sides of influence will be discussed.

Mode of delivery:
Face-to-face teaching, Twitter
Learning activities and teaching methods:
Lectures 27h, independent work 108h (personal reflections 28h, reading for the lectures 20h, assignment 60h)
Target group:

Prerequisites and co-requisites:
Understanding the roles of humans as users and developers of ICT
Recommended optional programme components:

Recommended or required reading:
Research articles, the web, to be announced more specifically during the course implementation.
Assessment methods and criteria:
Participation in the lectures, personal reflection reports, course assignments.
Grading:
1–5
Person responsible:
Harri Oinas-Kukkonen
Working life cooperation:
No

817604S: ICT and Organizational Change, 5 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Carl Lawrence

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits/134 hours of work
Language of instruction:
English

Timing:
2nd year, spring semester, periods 2+3
Learning outcomes:
After completing the course the student is:

- Able to distinguish various levels of organisational activities and their relations;
- Able to discuss about the role of information technology in various levels of change of organisation and its context;
- Able to analyse ICT-based organizational change process.

Contents:
The course studies organisations at four levels: individuals, practices, organizational structures and transformations, and the societal context of organisations. The organizational role of ICT and the relation between ICT and knowledge are also discussed. A method for analysing organisations as networks of activity systems is presented. The role of power, trust and control in the change process is discussed. The different aspects of change agents are presented and analysed.

Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Introductory lectures 20h, seminar sessions 14h, individual work 100h (for a review and analysis of selected course materials and making a presentation for the seminar).
Prerequisites and co-requisites:
B.Sc. or other equivalent degree and course Information Systems in Organisations (812304A) or equivalent knowledge.

Recommended optional programme components:

Recommended or required reading:
A list of research articles will be provided for the lectures and assignments. Readings for the background and theoretical framework are:
- Gareth R. Jones (2010) Organizational Theory, Design, and Change: Global Edition (6. Ed.) Chapters 1-3, 10-12, Prentice Hall.
- K. Kuutti (1996) Activity Theory as a potential framework for human-computer inter-action research, in Context and Consciousness: Activity Theory and Human Com-puter Interaction, B. Nardi, Editor. 1996, MIT Press: Cambridge. p. 17-44.
- Frank Blackler (1995) Knowledge, knowledge work and organizations: an overview and interpretation. Organization studies, 1995. Pp. 1021-1046
- Frank Blackler et al. (2000) Organizing Processes in Complex Activity Networks. Organization, vol. 7 no. 2. Pp. 277-300.

Assessment methods and criteria:
Lecture and seminar participation, assignment (literature review, analysis, seminar presentation). Alternatively by examination and personal assignment report.
Grading:
1-5
Person responsible:
Kari Kuutti
Working life cooperation:
No

812349A: IT Infrastructure, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits/134 hours of work

Language of instruction:
English

Timing:
1st year of Master's studies, spring semester, period 1

Learning outcomes:
After completing the course, students are able to judge, compare and apply data communications concepts to various situations encountered in industry; identify general concepts and techniques of data communications; explain the technology of the Internet; identify the most important server and storage architectures and the main mechanisms for providing high-capacity processing and storage capacity; and explain the regulatory environ-ment.

Contents:
1. Introduction to large-scale computing applications;
2. Network requirements and architecture;
3. Standards and standards bodies;
4. Network services and Middleware;
5. Internet services, protocols and technologies;
6. Underlying network technologies;
7. Performance monitoring, fault detection, recovery and restoration;
8. Next-generation network infrastructure, industry technology directions.

Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
Lectures (24 h), student project work (90 h) and examination (20 h).

Target group:

Prerequisites and co-requisites:
Student is familiar with basic computer architecture and the Internet.

Recommended optional programme components:

Recommended or required reading:
• Lecture notes;
• Supplementary technical and scientific articles;
• Phil Simon (2010) The next wave of technologies: opportunities from chaos. Wiley. ISBN 0-47-058750-4.

Reference books:
• Comer, D.E. (2009) Computer Networks and Internets. 5th edition. Pearson ISBN 0-13-504583-5. 600 p.
• Kurose J.F., Ross K.W. (2010) Computer Networking – A Top-Down Approach. 5th edition. Pearson ISBN 0-13-136548-7. 888 p.
• Travostino F., Mambretti J., Karmous-Edwards G. (2006) Grid Networks – Enabling grids with advanced communication technology. Wiley ISBN 0-470-01748-1. 340 p.

Assessment methods and criteria:
Individual project work, examination

Grading:
 1–5

Person responsible:
 Antti Juustila

Working life cooperation:
No

813623S: Information Security Policy and Management in Organisations, 5 op

Voimassaolo: 01.08.1950 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Mikko Siponen

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits/134 hours of work

Language of instruction:
English
Timing:
2nd year of Master's and GS3D studies, autumn semester, period 1

Learning outcomes:
After completing the course, the student is able to:

- Develop BPC;
- Develop organisation specific information security policies and sub-policy systems in organisations;
- Improve employees' compliance with the information security procedures through training, campaigning and other measures;
- Carry out risk management in practice;
- Estimate the economical investment in information security;
- Understand the strengths and weaknesses of information security management stan-dards;
- Understand the certifications in the area of information security management;
- Design information security policies at organisations.

Contents:
1. BCP;
2. Development of organisation specific information security policies and sub-policy systems at organisations;
3. Measuring employees' compliance with information security policies;
4. Improving employees' compliance with the information security procedures through training, campaigning and other means;
5. Information security risk management in practice, estimation of economical investment in information security;
6. Information security management standards;
7. Certifications related to information security.

Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 30h, exercises 18h, student preparation and reading for exercises and examination 86h.
Target group:

Prerequisites and co-requisites:
Bachelor degree or other equivalent degree and course "811168P Introduction to Information Security" or principles of information security, or similar knowledge obtained from other courses.
Recommended optional programme components:

Recommended or required reading:
Articles (to be announced later)
Assessment methods and criteria:
Examination.
Grading:
Grading: 1–5
Person responsible:
Mikko Siponen
Working life cooperation:
No

814601S: Progressive sandwich training, 5 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Advanced Studies

Laji: Practical training

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 ECTS credits/134 hours of work

Language of instruction:

Finnish/English
Timing:
Free
Learning outcomes:
After completing the course, a student:

- Masters professional ICT work in enterprises or public organisations;
- Can analyse and reflect on the work experience in Information Processing Science studies;
- Can write an informative report of their work experience.

Contents:
1. Working at least four months in professional ICT duties that require university level studies.
2. Analysing, reflecting and reporting on the work.

Mode of delivery:
Student's own work
Learning activities and teaching methods:
Professional ICT responsibilities and at least four months to fulfil the learning outcomes.
Target group:

Recommended optional programme components:

Recommended or required reading:
Studies and selected course materials are reflected on experience in professional ICT work.
Assessment methods and criteria:
Working on professional ICT responsibilities altogether for at least four months. Write a work report of 4 to 8 pages. The work experience is proved by delivering a signed letter of reference and extract of study attainments in Information Processing Science studies. Work experience can consist of more than one separate period with different employers. The student is required to document the levels of university studies needed to realise the professional work. Proposals to evaluate and develop the studies in the Information Processing Science curricula must be documented in the report.
Grading:
Pass/fail
Person responsible:
Kari Pankkonen
Working life cooperation:
Yes; see Assessments Methods and Criteria.

Other information:

814340A: Small-Group Tutoring, 3 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Heli Alatalo

Opintokohteen kielet: Finnish

ECTS Credits:
3 ECTS credits/80 hours of work

Language of instruction:
Finnish
Timing:

2 nd – 5 th year, autumn and spring semester, periods 1–4

Learning outcomes:
After passing the course a student (tutor) is able to:

- Draw up a supervision plan for his/her small group;
- Put into effect his/her supervision from the viewpoint of students and based on the given tutor training;
- Receive supervision and guidance experience;
- Take responsibility for his/her own supervision work.

Contents:
1. Group training, occasions and meetings 25h
2. Planning and implementation of small-group tutoring 53h
3. Writing his/her own report diary 2h.

Mode of delivery:
Face-to-face teaching and web-based teaching.

Learning activities and teaching methods:
Lectures, exercises and meetings. Practice as a small-group tutor in co-operation with other tutors, Blanko student organisation, library and own department's study-counsellors. Independent personal work.

Recommended or required reading:
Training materials, forms and own reports.

Assessment methods and criteria:
Active participation in tutor-training, implementing small-group tutoring and drawing up the supervision plan and the report diary.

Grading:
Pass/fail

Person responsible:
Heli Alatalo

Working life cooperation:
No

813630S: Software Business Development, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits/134 hours of work

Language of instruction:
 English

Timing:
The course unit is held in the autumn semester, during period 2. It is recommended to complete the course in the first or second year of Master's studies.

Learning outcomes:
The course provides insights to business development on a business, company and industry level. After completing the course, the student is able to plan how business is being developed over the whole life cycle of the business and company, conduct market and business analyses, identify different sources of financing for business operation, evaluate different strategic business options and select a business model adequate for the present and future situation of the company.

Contents:
The course takes three points of view: company start-up, established business, and software industry. The course introduces the concepts of business idea, business plan, software business models and strategies, and the software value network.

Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:

Lectures 24h, exercises 12h, course assignments 78h, exam 20h. The course assignments will be conducted as group work.

Target group:

Prerequisites and co-requisites:
The recommended prerequisite is the completion of the following courses prior to enrolling for the course unit: 811174P Introduction to Software Business, 813316A Business Process Modelling and 813620S Software Business and IT Management.
Recommended or required reading:
Refer to the course web pages

Assessment methods and criteria:
This course unit utilizes continuous assessment. Lectures are for the most part voluntarily, but participation is recommended. The students will write course assignments which will be assessed. In addition, there will be an exam at the end of the course which will be assessed. The assessment of the course unit is based on the learning outcomes of the course unit.

Grading:
 1–5
Person responsible:
 Karin Väyrynen
Working life cooperation:
No

817603S: System Design Methods for Information Systems, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Li Zhao

Opintokohteen kielet: English

ECTS Credits:
5 credits/134 hours of work

Language of instruction:
English
Timing:
1st year of Master's and GS3D studies, autumn semester, period 1

Learning outcomes:
After completing the course, students will be able to describe the defects inherent in the traditional waterfall model and explain how other methods aim to answer its defects, and other challenges in information systems development (ISD). In particular, students will be able to use and apply socio-technical methods like SSM and ETHICS and their underlying techniques in re-planning and developing the sub-systems (automated and non-automated) and work-flows in an organization. Students will also learn how to analyse the differences and similarities of philosophies underlying ISD methods. This will give students the ability to compare methods with each other, assess and give arguments for a decision as to which method is suitable for an ISD project in an organization. In addition, students will be able to describe the issues relating to the management of global information systems.

Contents:
What is information systems development (ISD) and waterfall method, socio-technical methods like SSM and ETHICS, miscellaneous methods or frameworks like Agile, ISAC, PRINCE2, business process re-engineering, rapid application development, evolutionary approach. Managing global systems.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 20h, exercises 24h, homework 30h, essay 30h, examination 30h.

Target group:

Prerequisites and co-requisites:
Bachelor studies recommended

Recommended optional programme components:

Recommended or required reading:
Avison, D., Fitzgerald, G. (2006) Information Systems Development, methodologies, techniques & tools. 4th Edition. London: McGraw-Hill; Laudon, K.C., Laudon, J.P. (2010) Management Information Systems, Managing the Digital Firm. 11th Edition. Upper Saddle River, New Jersey: Pearson Education. Chapter 15: Managing Global Systems.
Assessment methods and criteria:
Examination, accepted essay, accepted exercise assignments
Grading:
1-5
Person responsible:
Tero Vartiainen
Working life cooperation:
No

812671S: Usability Testing, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Mikko Rajanen

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits/134 hours of work

Language of instruction:
English and Finnish
Timing:
1 st – 2 nd year of Master's studies, spring semester, periods 3 and 4

Learning outcomes:
After completing the course, the student can:

- Design and follow through a usability testing process;
- Design usability test scenarios and tasks;
- Select test subjects;
- Plan and follow through usability tests as laboratory tests or field tests;
- Analyse and report the findings from usability tests.

Contents:
Basic terms and types of usability testing, usability tests process, usability test tasks and scenarios, test subjects, following through a usability test, analysing usability test material, reporting the findings from usability tests.

Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 24h, assignment tutoring 13h, assignment 90h, seminar 7h.
Target group:

Prerequisites and co-requisites:
Student is familiar with most common user interface design terms, design and evaluation methods as in "811379A Introduction to Human-Computer Interactions" course.
Recommended optional programme components:

Recommended or required reading:
Structure and contents of the course are based on:
- Dumas, J. S. & Redish, J. C. (1993): A Practical Guide to Usability Testing. Ablex Publishing Corporation.
- Rubin, J. (1994): Handbook of Usability Testing: How to Plan, Design, and Conduct Effective Tests. Chichester: John Wiley & Sons, Inc.

Assessment methods and criteria:
Assessment of the course is based on the learning outcomes of the course based on the written usability test plan, supervised usability tests, written usability test report and oral seminar presentation

Grading:
 Pass/fail
Person responsible:
Mikko Rajanen
Working life cooperation:
No
Other information:
Work placements: No

817604S: ICT and Organizational Change, 5 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Carl Lawrence

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits/134 hours of work
Language of instruction:
English
Timing:
2nd year, spring semester, periods 2+3
Learning outcomes:
After completing the course the student is:

- Able to distinguish various levels of organisational activities and their relations;
- Able to discuss about the role of information technology in various levels of change of organisation and its context;
- Able to analyse ICT-based organizational change process.

Contents:
The course studies organisations at four levels: individuals, practices, organizational structures and transformations, and the societal context of organisations. The organizational role of ICT and the relation between ICT and knowledge are also discussed. A method for analysing organisations as networks of activity systems is presented. The role of power, trust and control in the change process is discussed. The different aspects of change agents are presented and analysed.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Introductory lectures 20h, seminar sessions 14h, individual work 100h (for a review and analysis of selected course materials and making a presentation for the seminar).
Prerequisites and co-requisites:
B.Sc. or other equivalent degree and course Information Systems in Organisations (812304A) or equivalent knowledge.

Recommended optional programme components:

Recommended or required reading:
A list of research articles will be provided for the lectures and assignments. Readings for the background and theoretical framework are:

- Gareth R. Jones (2010) Organizational Theory, Design, and Change: Global Edition (6. Ed.) Chapters 1-3, 10-12, Prentice Hall.
- K. Kuutti (1996) Activity Theory as a potential framework for human-computer inter-action research, in Context and Consciousness: Activity Theory and Human Com-puter Interaction, B. Nardi, Editor. 1996, MIT Press: Cambridge. p. 17-44.
- Frank Blackler (1995) Knowledge, knowledge work and organizations: an overview and interpretation. Organization studies, 1995. Pp. 1021-1046
- Frank Blackler et al. (2000) Organizing Processes in Complex Activity Networks. Organization, vol. 7 no. 2. Pp. 277-300.

Assessment methods and criteria:
Lecture and seminar participation, assignment (literature review, analysis, seminar presentation). Alternatively by examination and personal assignment report.

Grading:
1-5

Person responsible:
Kari Kuutti

Working life cooperation:
No

812349A: IT Infrastructure, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits/134 hours of work

Language of instruction:
English

Timing:
1st year of Master's studies, spring semester, period 1

Learning outcomes:
After completing the course, students are able to judge, compare and apply data communications concepts to various situations encountered in industry; identify general concepts and techniques of data communications; explain the technology of the Internet; identify the most important server and storage architectures and the main mechanisms for providing high-capacity processing and storage capacity; and explain the regulatory environ-ment.

Contents:
1. Introduction to large-scale computing applications;
2. Network requirements and architecture;
3. Standards and standards bodies;
4. Network services and Middleware;
5. Internet services, protocols and technologies;
6. Underlying network technologies;
7. Performance monitoring, fault detection, recovery and restoration;
8. Next-generation network infrastructure, industry technology directions.

Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
Lectures (24 h), student project work (90 h) and examination (20 h).

Target group:

Prerequisites and co-requisites:
Student is familiar with basic computer architecture and the Internet.

Recommended optional programme components:

Recommended or required reading:
- Lecture notes;
- Supplementary technical and scientific articles;
- Phil Simon (2010) The next wave of technologies: opportunities from chaos. Wiley. ISBN 0-47-058750-4.

Reference books:
- Comer, D.E. (2009) Computer Networks and Internets. 5th edition. Pearson ISBN 0-13-504583-5. 600 p.
- Kurose J.F., Ross K.W. (2010) Computer Networking – A Top-Down Approach. 5th edition. Pearson ISBN 0-13-136548-7. 888 p.
- Travostino F., Mambretti J., Karmous-Edwards G. (2006) Grid Networks – Enabling grids with advanced communication technology. Wiley ISBN 0-470-01748-1. 340 p.

Assessment methods and criteria:
Individual project work, examination
Grading:
 1–5
Person responsible:
 Antti Juustila
Working life cooperation:
No

813623S: Information Security Policy and Management in Organisations, 5 op

Voimassaolo: 01.08.1950 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Mikko Siponen

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits/134 hours of work
Language of instruction:
English
Timing:
2nd year of Master's and GS3D studies, autumn semester, period 1

Learning outcomes:
After completing the course, the student is able to:

- Develop BPC;
- Develop organisation specific information security policies and sub-policy systems in organisations;
- Improve employees' compliance with the information security procedures through training, campaigning and other measures;
- Carry out risk management in practice;
- Estimate the economical investment in information security;
- Understand the strengths and weaknesses of information security management stan-dards;
- Understand the certifications in the area of information security management;
- Design information security policies at organisations.
Contents:
1. BCP;
2. Development of organisation specific information security policies and sub-policy systems at organisations;
3. Measuring employees' compliance with information security policies;
4. Improving employees' compliance with the information security procedures through training, campaigning and other means;
5. Information security risk management in practice, estimation of economical investment in information security;
6. Information security management standards;
7. Certifications related to information security.
Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
Lectures 30h, exercises 18h, student preparation and reading for exercises and examination 86h.
Target group:

Prerequisites and co-requisites:
Bachelor degree or other equivalent degree and course "811168P Introduction to Information Security" or principles of information security, or similar knowledge obtained from other courses.
Recommended optional programme components:

Recommended or required reading:
Articles (to be announced later)
Assessment methods and criteria:
Examination.
Grading:
Grading: 1–5
Person responsible:
Mikko Siponen
Working life cooperation:
No

813624S: Information Systems Theory, 7 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Tero Vartiainen

Opintokohteen kielet: English

ECTS Credits:
7 ECTS credits/187 hours of work
Language of instruction:
 English
Timing:
2nd year of Master's studies, autumn semester, periods 1 + 2

Learning outcomes:
: After completing the course, the student:

• Will have a good knowledge and understanding of a broad array of research topics and themes within the field of information systems;
• Will have good knowledge and understanding of information systems research and the process by which that research is produced;
• Can publish critical IS research articles in some of the leading academic journals and conference proceedings;
• Can critically analyse and synthesise academic sources;
• Can verbally present arguments in an academic fashion;
• Can write a literature review on an IS research topic.
Contents:
1. Information Systems Research Overview
2. A contemporary selection of IS research themes, such as:
• Information systems success and failure;
• Information systems development;
• Understanding the end-user;
• Risk management;
• Cultural Issues in information systems.

Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:

Lectures 1.5 ECTS credits (40.5h), class preparation 1.5 ECTS (40.5h), and exercises 4 ECTS (107h).

Target group:
Master's level students
Prerequisites and co-requisites:
Bachelor degree or other equivalent degree and "Research Methods" course (813621S). 813624S is a substantive overview of research in information systems, not a methods course, and students should be familiar with research methods prior to enrolling in 813624S.
Recommended optional programme components:

Recommended or required reading:
To be announced during the course implementation
Assessment methods and criteria:
Class Preparation:
Paper summaries   15%
Class Discussion   15%
Class Quizzes   15%

Exercises:
Research Proposal One   2.5%
Essay Assignment One   25%

Research Proposal Two   2.5%
Essay Assignment Two   25%

Note that there is no final exam.

Grading:
1–5
Person responsible:
Tuure Tuunanen
Working life cooperation:
No
Other information:
Course material can be found at OPTIMA e-learning environment, Urkund is used for course work submissions.

813613S: Master's Thesis, 30 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

ECTS Credits:
30 ECTS credits/800 hours of work.

Language of instruction:
Finnish/English.

Timing:
Timing is free; execution can be allocated over several semesters. Obligatory for Master's degree. During 1st and 2nd year of Master's studies.
Learning outcomes:
After completing the thesis the student can:

• Define a relevant focused problem in the field of information processing science;
• Apply a scientific method as a tool in solving the stated research problem;

- Synthesise research results and evaluate their validity;
- Write a scientific thesis based on the accomplished research according to the de-partment's guidelines;
- Participate in the evolution of ICT and postgraduate studies after completing the thesis.

Mode of delivery:
Face-to-face meetings and electronic communication with the supervisor.

Learning activities and teaching methods:
Conducting and reporting research under supervision of personal advisor.

Prerequisites and co-requisites:
The research plan and the final draft of the thesis will be presented in the "Master's Thesis Seminar" (813602S).

Grading:
The supervisor and a second independent reviewer will evaluate the thesis using the scale 1–5.

Person responsible:
Professors of the department.

Working life cooperation:
Especially empirical Master's theses are often done in cooperation with private or public sector.

815653S: Open Source Software Development, 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Henrik Hedberg

Opintokohteen kielet: English

ECTS Credits:
4 ECTS credits/108 hours of work

Language of instruction:
English

Timing:
2 nd year of Master's studies, autumn semester, periods 1 + 2

Learning outcomes:
After completing the course, a student is able to:

- Define the historical background and the ideology of OSS;
- Participate in an OSS development project;
- Evaluate the impact of using OSS and OSS licenses in software development and exploitation;
- View the phenomenon through essential scientific research.

Contents:
Open Source Software (OSS) is one of the most topical phenomena in software development. It affects both software production and the decisions of user organisations. OSS can be studied from different social, legal, economical, software engineering and data security viewpoints. The course covers the range of scientific findings on the OSS paradigm. The course introduces the Open Source Software (OSS) development paradigm and current topics in OSS research. The aim is to study from different viewpoints, for example, what OSS is and what it is not, the history and organisation of OSS projects, methods of OSS development and usage, as well as licensing models and possible risks. The emphasis is on research work.

Mode of delivery:
Mostly face-to-face teaching but some parts are implemented as distance teaching

Learning activities and teaching methods:
Lectures and seminars about 40h, exercises about 10h, seminar paper about 58h.

Prerequisites and co-requisites:

Compulsory prerequisites are bachelor degree or other equivalent degree and basic knowledge of software engineering and research work. The course allows passing Project II following the OSS development principles or a Master's thesis on an OSS topic.

Recommended optional programme components:

Recommended or required reading:
Fogel, K. (2005): Producing Open Source Software - How to Run a Successful Free Software Project, O'Reilly Media; Rosen L. (2004): Open Source Licensing: Software Freedom and Intellectual Property Law, Prentice Hall; international articles covering the topic.

Assessment methods and criteria:
Active participation and a seminar paper

Grading:
1-5

Person responsible:
Henrik Hedberg

Working life cooperation:
No

810129P: Orientation Studies for International Students, 4 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Pankkonen, Kari Johannes

Opintokohteen kielet: English

ECTS Credits:
4 ECTS credits/108 hours of work

Language of instruction:
 English

Timing:
1 st year of GS ^{3}D studies, autumn semester, period 1+2

Learning outcomes:
After passing the course a student:

- Knows the basics of Finnish culture and the Finnish university system;
- Knows the city of Oulu and its services;
- Is able to discuss multicultural features and competencies within ICT business and academic life;
- Is able to exploit services of the most important organisations, units and communities (e.g. own department TOL, own student guild Blanko and Tellus library of own faculty) from the viewpoint of his/her studies and knows how to influence in this environment;
- Recognises the basic characteristics of his/her own curriculum;
- Is able to plan his/her own studies and forthcoming study path;
- Is able to create, update and present his/her Personal Study Plan (PSP).

Contents:
- Finnish culture and university system;
- Multicultural communication, ICT business and academic life;
- City of Oulu, University of Oulu, the study environment and student influence in it;
- Own department, own student guild, own curriculum and own study path;
- PSP and PSP process.

Mode of delivery:
Blended teaching

Learning activities and teaching methods:
Group occasions, lectures, exercises and seminars (60h), teacher tutoring (8h), student tutoring (8h), personal supervision discussions (4h), independent personal work (28h).

Target group:

Recommended or required reading:
Lecture materials by web-based learning environments, www pages, study guides, brochures, forms, etc.
Assessment methods and criteria:
Active participation, PSP, other required reports

Grading:
Pass/fail
Person responsible:
Kari Pankkonen
Working life cooperation:
No

817606S: Project in Distributed Global Context, 11 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Tonja Molin-Juustila

Opintokohteen kielet: English

ECTS Credits:
11 ECTS credits/300 hours of work
Language of instruction:
English
Timing:
1 st year of exchange and GS ^{3}D Master's studies for two periods: spring semester, periods 3 & 4 (recommended). Or 2 nd year, autumn semester, periods 1 & 2.
Learning outcomes:
After completing the course a students should demonstrate their abilities to work on a challenging ICT project. Students will learn to acquire and apply new knowledge in the topic of the project. Students will also demonstrate their skills to conduct an ICT project in a professional way. By completing this course, students can act as independent professional members of an ICT project and have learnt professionalism in the project work and management.

As a professional in conducting a project in managed way the student:
- Can plan the project;
- Can search up to date information on the topic of the project and apply this in the project work;
- Can manage the progress of the project with the steering group/project team organisation (reporting the progress and results of the project, the use of the steering group in decision making and problem resolution);
- Can follow the progress of the project in real time within the project team;
- Can work as a responsible project team member;
- Can produce realistic outcome in relation to project resources.
Contents:
Starting lecture, where the steps of carrying out the course will be described together with allocating the project assignments to project teams. The project work will take about two periods (one semester).

Mode of delivery:
Face-to-face teaching at the beginning together with web-based learning environment, mainly project work as collaborative team work, each project group supported with private supervisor.
Learning activities and teaching methods:
Project work 300h per student. Attendance at the starting lecture is mandatory.
Prerequisites and co-requisites:
Mandatory: B.Sc. degree or other equivalent degree. Students enrolling directly to the Master's programme should take the "Project Management Principles (811311A)" course first (autumn semester, 3 rd year of B.Sc. studies, period 1) or otherwise master the basics of project work and management as in Pressman, R.S. *Software Engineering: A Practitioner's Approach*, the chapters related to project management.

Recommended or required reading:

Unique project material provided by the customer of the project and/or material to be collected and studied by the project team.
Assessment methods and criteria:
Professional project management skills will be reported in a project portfolio. Assessment criteria will be given at the starting lecture and in the web-based learning environment in detail.

Grading:
Every member of a project team will get the same grade (scale 1–5).

Person responsible:
Tonja Molin-Juustila
Working life cooperation:
Yes. Learning by doing, i.e. managing authentic, resource-limited project work and integrating the practices of an academic expert into the unique project assignment.

813621S: Research Methods, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Tero Vartiainen

Opintokohteen kielet: English

Leikkaavuudet:

    521146S   Research Methods in Computer Science   5.0 op

ECTS Credits:
5 ECTS credits/134 hours of work

Language of instruction:
English
Timing:
The course starts in autumn and continues to spring semester (periods 2 and 3). It is recommended that the course is completed during the first year of Master's studies.

Learning outcomes:
Having completed the course, the student is able to explain the general principles of scientific research and the practices of scientific methodology. The student is also able to generate research problems in information systems and software engineering. The student is able to identify and describe the main research approaches and methods in information systems and software engineering and choose the appropriate approach and method for a research problem. The student is also able to evaluate the methodological quality of a research publication. After the course the student is able to choose and apply the proper approach and method for his or her Master's thesis and find more information on the method from scientific literature.
Contents:
Introduction to general scientific principles, scientific research practices and quality of scientific publications, qualitative research approaches and selected research methods, quantitative research approaches and selected research methods, design science research and selected methods, requirements and examples of Master's theses, evaluation of research.

Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
Lectures 40h, exercises 30h and individual work 64h. Learning diary is written about the lectures and exercises. Exercises include group work.

Target group:

Prerequisites and co-requisites:
Completion of Bachelor's studies

Recommended optional programme components:

Recommended or required reading:
Lecture slides and specified literature

Assessment methods and criteria:
Accepted learning diary

Grading:
Pass/fail

Person responsible:
Tero Vartiainen
Working life cooperation:
No

813620S: Software Business Management, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Marianne Kinnula

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits/134 hours of work

Language of instruction:
 English

Timing:
1 st–2 nd year of Master's studies, autumn semester, period 1

Learning outcomes:

After completing the course, the student:

- Is able to assess the main problem areas in software business management and is able to describe how to manage these problems;
- Is able to find, when needed, different kinds of tools for managing this diverse and ambiguous environment;
- Is able to describe how to manage competent and creative persons who often have strong personalities;
- Is able to analyse a company situation in a continually changing, unpredictable and even hostile environment, and is able to make well-grounded recommendations for the company courses of action;
- Understands the significance and role of IT decisions in business strategy.

Contents:
The software business environment and context is complex and under continuous change. Competences and creativity of company employees are needed for creating value and growth to the company. Managing a software business is a challenging task as traditional, rational management models are often inadequate for the needs of the managers. In IT, management value is created through technology and alignment of technology and business strategies. Business and technology management need to work together.

This course provides an overview of the management of the software business in a software company. Aspects of management of SME companies are discussed as well as significance of IT management in an organisation.
Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
Lectures 28–34h, an exam 25h, group work 30h, course assignments and independent work 44.5–50.5h.

Prerequisites and co-requisites:
Basic understanding of the software business is an advantage.
Recommended optional programme components:

Recommended or required reading:
Refer to the course web pages.
Assessment methods and criteria:
Participation in lectures/exercises/seminars, course assignments, exam.
Grading:
1-5
Person responsible:
Marianne Kinnula
Working life cooperation:
No

817602S: Software Development in Global Environment, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Similä, Jouni Kalervo

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits/134 hours of work.

Language of instruction:
English
Timing:
1 st year of Master's studies; 2012 spring semester, period 4; 2012 fall semester, period 1; in the following years the course will be implemented during the fall semester

Learning outcomes:
After completing the course, the student

- Can define the key success factors of the GSD and the potential problems in coordination of projects where teams are separated by physical and/or temporal distance;
- Can define and evaluate the collaborative technologies, which in the best way support distributed software development;
- Can choose the methods and tools for distributed software development;
- Can apply the practices of GSD in a student project and use the supporting tools throughout the project life cycle.

Contents:
Some of the topics covered are strategic issues in distributed development (off-shoring, near-shoring, outsourcing, OSS); cost-benefit-risk analysis; the triad of coordination, control and communication; team building (e.g. virtual teams); software process paradigms in the global environment (planned, agile); methods and tools for distributed software development; issues related to allocation of tasks; communication issues that arise due to distance and time zone differences; infrastructure support; geographical dispersion; lack of information communication; coordination complexity; cultural issues; technical issues related to information and artefact sharing; architectural design; and finally knowledge management issues. The lectures and seminars also review current research aspects of the GSD and related teaching case studies from industry. The exercises demonstrate distributed software development as a virtual team with the support of appropriate methods and tools.
Mode of delivery:

Face-to-face lectures and seminars with all the students. Lecture assignments (article presentations and acting as opponents) for groups of 4 students. Study groups with groups of 8 students using case-based teaching method. Communication between exercise groups is done over the internet.

Learning activities and teaching methods:
Lectures and seminars involving all the students 30h and 30 h of reading (in English), study groups involving 8 students 20h, and exercises 50h. During the seminars a team of 4 students will present a selected research article and another team of 4 students will act as opponents. In the study groups a relevant teaching case from industry is discussed with the students. Each student will prepare a written analysis of the case before the discussion and a reflective analysis after the discussion. The exercises include laboratory demonstrations of different supporting tools for distributed software development. The students train in project software development and planning practices in a distributed environment. The student project groups are organised into virtual (distributed) teams of 4 students.

Target group:

Recommended or required reading:
To be announced during the course implementation.
Assessment methods and criteria:
By active participation or alternatively exam, based on the course study materials.
Grading:
1–5, active participation: lectures (20%), lecture assignments (30%), study groups (10%), exercises (40%).

Person responsible:
Jouni Similä
Working life cooperation:
No
Other information:
Participation: The course is obligatory for GS [3]D students and software engineering students; the total number of students is limited according to the departmental selection rule (valintasääntö, kts. Opinto-opas). 80% attendance is required. Web page **:** http://www.tol.oulu.fi/index.php?id=1125

815660S: Software Engineering Management, Measurement and Improvement, 4 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Ayse Tosun Misirli

Opintokohteen kielet: English

ECTS Credits:
4 ECTS credits/108 hours of work

Language of instruction:
English
Timing:
2 [nd] year of Master's and GS [3]D studies, autumn semester, period 2

Learning outcomes:
After completing the course the student understands the fundamental principles of software processes and their development in professional software engineering. The course extends the quality understanding based on individual techniques (e.g. reviews) so that after completing the course the student is able to:

- Evaluate different methods and techniques;
- Select from them appropriate ones for different software engineering environments;
- Have capabilities to participate in systematic efforts for improvement in software companies.

Contents:

The course covers the most fundamental process centred software quality improvement and management approaches, methods and latest research results, as well as approaches to software measurement. The topics of the course include: traditional waterfall, agile (extreme programming, scrum, rational unified process, crystal, feature driven development, adaptive software development, dynamic systems development method) and lean methods, process improvement approaches, software process and product measurement, agile and lean practices, process improvement at the enterprise level and practical examples from software industry.

Learning activities and teaching methods:
Lectures 18h, study group working 25h, paper reading 25h, seminar 20h, report writing 20h

Target group:

Prerequisites and co-requisites:
B.Sc. or other equivalent degree and basic knowledge of software engineering

Recommended optional programme components:

Recommended or required reading:
- CMMI: Guidelines for Process Integration and Product Improvement. Mary Beth Chrissis, Mike Konrad, Sandy Shrum. Addison-Wesley, ISBN 032-115496-7, 2004.
- Agile Project Management with Scrum. Ken Schwaber, Microsoft Press, ISBN 0-7356-1993-X. 2004.
- Dingsøyr T., Dybå T., Moe N.B., Agile Software Development: Current Research and Future Directions, Springer, 2010
- C. Jones, Applied Software Measurement: Global Analysis of Productivity and Quality, 3rd ed. McGraw-Hill Osborne Media, 2008.
- Craig Larman and Bas Vodde, Scaling Lean & Agile Development: Thinking and Organizational Tools for Large-Scale Scrum, Addison-Wesley, 2009

Assessment methods and criteria:
Active and regular participation to lectures and seminars AND report evaluation AND seminar presentations

Grading:
1–5

Person responsible:
Ayse Tosun Misirli

Working life cooperation:
No

815661S: Software Engineering Research, 7 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

ECTS Credits:

7 ECTS credits/187 hours of work

Language of instruction:
English

Timing:
2 nd year of Master's studies, autumn semester, period 1+2

Learning outcomes:
After completing the course the student will know the current research areas in software engineering and the most important software engineering research methods. The student understands academic research and publishing in software engineering, and is able to critically analyse scientific articles from the viewpoint of the content and research methods used in the article. The student is able to present academic research and actively participate in an academic discussion of research papers and research results.

Contents:

Research areas in software engineering, research methods.

Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
Lectures, assignments related to lectures, presentations, report. Lectures and seminars 42h, assignments 105h, report 40h.
Target group:

Prerequisites and co-requisites:
B.Sc. or other equivalent degree
Recommended optional programme components:

Recommended or required reading:
Wohlin C., Runeson P., Höst M., Ohlsson M., Regnell B., Wesslen A., Experimentation in Software Engineering, Kluwer Academic Publishers, 2000, lecture material, software engineering scientific literature.

Assessment methods and criteria:
Assignments related to lectures, report. There is no final exam.
Grading:
1–5
Person responsible:
Ayse Tosun Misirli
Working life cooperation:
No
Other information:
Course material can be found at Optima.

817603S: System Design Methods for Information Systems, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Li Zhao

Opintokohteen kielet: English

ECTS Credits:
5 credits/134 hours of work

Language of instruction:
English
Timing:
1st year of Master's and GS3D studies, autumn semester, period 1

Learning outcomes:
After completing the course, students will be able to describe the defects inherent in the traditional waterfall model and explain how other methods aim to answer its defects, and other challenges in information systems development (ISD). In particular, students will be able to use and apply socio-technical methods like SSM and ETHICS and their underlying techniques in re-planning and developing the sub-systems (automated and non-automated) and work-flows in an organization. Students will also learn how to analyse the differences and similarities of philosophies underlying ISD methods. This will give students the ability to compare methods with each other, assess and give arguments for a decision as to which method is suitable for an ISD project in an organization. In addition, students will be able to describe the issues relating to the management of global information systems.

Contents:
What is information systems development (ISD) and waterfall method, socio-technical methods like SSM and ETHICS, miscellaneous methods or frameworks like Agile, ISAC, PRINCE2, business process re-engineering, rapid application development, evolutionary approach. Managing global systems.

Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 20h, exercises 24h, homework 30h, essay 30h, examination 30h.
Target group:

Prerequisites and co-requisites:
Bachelor studies recommended

Recommended optional programme components:

Recommended or required reading:
Avison, D., Fitzgerald, G. (2006) Information Systems Development, methodologies, techniques & tools. 4th Edition. London: McGraw-Hill; Laudon, K.C., Laudon, J.P. (2010) Management Information Systems, Managing the Digital Firm. 11th Edition. Upper Saddle River, New Jersey: Pearson Education. Chapter 15: Managing Global Systems.
Assessment methods and criteria:
Examination, accepted essay, accepted exercise assignments
Grading:
1-5
Person responsible:
Tero Vartiainen
Working life cooperation:
No

812650S: Advanced Topics in Human-Centred Design, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Kuutti, Kari Pekka Tapani

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits/134 hours of work
Language of instruction:
  English
Timing:
1 st – 2 nd year of Master's studies, autumn semester, period 1

Learning outcomes:
After completing the course, students can evaluate the usefulness and efficiency of various specific methods and frameworks used in human-centred design, and they can use a specific framework or method to collect data and analyse it to provide novel information for design.
Contents:
The content of the course will change with time. The initial set of topics includes:
- The role of field studies in human-centred design;
- Post-cognitivist theories of interaction;
- Information ecologies and infrastructures;
- User experience as an object of analysis and design;
    - Participatory design, end-user design and living labs.
Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
Lectures 20h, assignments 100h, seminars 14h

Target group:

Prerequisites and co-requisites:

Course "812335A Interaction Design" or similar knowledge.

Recommended optional programme components:

Recommended or required reading:
A collection of research papers supported with lecture materials. Students may also need to collect some study material by themselves.
Assessment methods and criteria:
Depending on the implementation group and/or individual assignments, evaluated according predefined evaluation criteria and in some implementations a participation activity may also be important.
Grading:
  1–5
Person responsible:
  Kari Kuutti
Working life cooperation:
No

817608S: Digital Service Innovation and Design, 5 op

Voimassaolo: 01.01.2012 - 30.11.2012

Opiskelumuoto: Advanced Studies

Laji: Course

Arvostelu: 1 - 5, pass, fail

Opettajat: Tuure Tuunanen

Opintokohteen kielet: Finnish

ECTS Credits:
5 ECTS credits/134 hours of work

Language of instruction:
English
Timing:
1 st and 2 nd year of Master's studies, spring semester, period 4
Learning outcomes:
After completing the course, the student:

- Will have good knowledge and understanding of research in the area of digital service innovation, co-creation, development, and design;
- Can acquire knowledge and read critically relevant research articles in some of the leading academic journals and conference proceedings;
- Can apply conceptual digital service development and design models and methods in practice;
- Can produce a digital service specification and a project plan for development;
- Can verbally present a business plan to a potential venture capital investor.

Contents:
1. Digital Service Innovation and Design Overview
2. A contemporary selection of research themes, such as:
- Service-dominant logic for digital services;
- Service modularity and digital services;
- Business models for digital services;
- Digital service development;
- Discovering digital service needs;
- Digital service modelling;
- Digital service co-creation.

Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 1.5 ECTS credits (40.5h), class preparation 1 ECTS (26.7h), exercises 1.5 ECTS (40.5h), and final exam preparation 1 ECTS (26.7 h).
Recommended or required reading:
To be announced during the course implementation

Assessment methods and criteria:
Class Preparation:

Class Quizzes	15%

Exercises:

Group project Deliverable & Presentation	20%
Individual Assignment	15%

Final Exam	50%

Grading:
1-5
Person responsible:
Tuure Tuunanen
Working life cooperation:
No
Other information:
Course material can be found at OPTIMA e-learning environment.

817610S: Doing Software Business in China, 5 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Xiaosong Zheng

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits/134 hours of work
Language of instruction:
English
Timing:
1 st – 2 nd year, spring semester, period 4

Learning outcomes:
After completion of the course, students will have a comprehensive understanding of software as a business and an industry in China. Students will recognise success factors, business models and development trends of the software business in China. Students will also understand the special characteristics of the software business in China.
Contents:
In the course a number of software business topics will be covered and these include: the current software market in China; software products and services in China; internationalisation and globalisation; revenue generation concepts; business planning in China; financing, pricing, cost and profitability; offer calculation; software engineering processes, and business project and entrepreneurship in China.

Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 20h, assignment 60h, and exam 54. In the lectures much of the time will be devoted to discussing specific topics in small groups and among the class as a whole. In addition, case studies, home assignments and in-class presentation will be used. For the home assignment students are required to form a group (2 students per group) to complete a written report on a specific software business topic.
Recommended or required reading:
There is no prescribed textbook for this course. Instead, a reading brick comprising lecture notes, book chapters, journal articles and case studies relating to the various topics being covered will be made available for downloading.
Assessment methods and criteria:
1) Exam (50%), 2) home assignment and in-class presentation (50%).
Grading:

1-5
Person responsible:
Xiaosong Zheng
Working life cooperation:
No

815308A: Embedded Software Development Environments, 4 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Henrik Hedberg

Opintokohteen kielet: English

Leikkaavuudet:

  811359A   Mobile Systems Programming   6.0 op

  811359A-01   Programming mobile devices, exercise work   0.0 op

  811359A-02   Programming mobile devices, exam   0.0 op

ECTS Credits:
4 ECTS credits/108 hours of work

Language of instruction:
  English
Timing:
1 st year of Master's and GS ^{3}D studies, spring semester, period 4

Learning outcomes:
After completing the course, a student is able to work with the essential software development tools of a selected embedded platform. The student is able to implement memory and power efficient applications by exploiting existing libraries and knowledge of the programming interfaces provided by the platform.
Contents:
The focus of the course is in the software development environments and tools for embedded platforms, such as Android, iOS, Windows Phone and PIC32. In addition, the course covers memory and power management, the core services of the platform, and the utilisation of existing libraries, such as Qt. One platform will be selected for deeper study, and the course introduces its essential software development tools and libraries. The emphasis is on application development for the platform as an exercise.
Mode of delivery:
Blended teaching

Learning activities and teaching methods:
Lectures and exercises about 40h, exercise work 68h

Target group:

Prerequisites and co-requisites:
Course "815309A Real-time Distributed Software Development", C/C++ and/or Java programming skills or similar knowledge obtained from other courses.
Recommended optional programme components:

Recommended or required reading:
Course material, the documentation of selected technologies, and other related literature
Assessment methods and criteria:
Assessment methods: Exercise work
Grading:
Grading: 1–5
Person responsible:
Responsible person: Henrik Hedberg
Working life cooperation:

No

813619S: Emerging Technologies and Issues, 4 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Oinas-Kukkonen, Harri Ilmari

Opintokohteen kielet: English

ECTS Credits:
4 ECTS credits/108 hours of work
Language of instruction:
English
Timing:
1st year of Master's and GS3D studies, spring semester, period 3
Learning outcomes:
After completing the course, the student is able to:

• Analyse the on-going changes in consumer behaviour, customer requirements, ICT markets and technological development;
• Evaluate key enabling web technologies and become an effective participant in web-enabled business endeavours and initiatives;
• Design ways of leveraging the technology to improve intra- and inter-organisational processes and enhance a firm's competitive position;
• Develop his/her skills for building careers and taking advantage of entrepreneurial opportunities through emerging technologies; and
• Categorise and compare factors that influence how relevant an emerging technol-ogy will be in the long run.
Contents:
1.   Development trends of the ICT industry and technology convergence, in particular related to the World Wide Web.
2.   What are emerging technologies; what has their economic and other impact been to date; what is their potential impact; projections of future impact?
3.   The creation and transformation of goods and services through emerging technolo-gies (service science) and their impact on organisations, markets, industries and society.
4.   How is the web reshaping business and how can business leverage emerging tech-nologies?
5.   Search for innovations.
6.   Understand concepts of business intelligence, market analysis, technology road mapping and scenarios.
7.   Future forecasting and research methods and theories of technological innovation and diffusion.
8.   Technological Trends: What innovations in the emerging technologies can we ex-pect in the near future?
Selected information technology trends: cloud computing, social media system, crowdsourcing, Web 3.0, etc.

Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
27h lectures, 81h independent work.

Target group:

Prerequisites and co-requisites:
None
Recommended optional programme components:

Recommended or required reading:
Refer to the course web pages

Assessment methods and criteria:
Exam
Grading:

Grading: 1–5
Person responsible:
Harri Oinas-Kukkonen
Working life cooperation:
No

812350A: Enterprise Systems, 4 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Li Zhao

Opintokohteen kielet: English

ECTS Credits:
4 ECTS credits/108 hours of work
Language of instruction:
English
Timing:
1st year of Master's and GS3D studies, spring semester, period 4

Learning outcomes:
After completing the course, the student:

• Is able to evaluate the processes used in a competitive environment;
• Is able to describe how processes integrate the internal functions of the firm and al-low the firm to interact with its environment;
• Is able to recognise, model, and improve processes to achieve efficiency and com-pliance objectives;
• Understands the role of ERP, SCM, and CRM systems etc. as components of the enterprise architecture;
• Understands process development and lifecycle management;
• Is able to explain the impact of automation on work practices.

Contents:
1. A strategic view of processes; concepts of organisational efficiency and effective-ness;
2. Integrating the functional areas of the organisation;
3. Relating processes to the financial, customer, and product-oriented goals of the firm;
4. Supply chain management (SCM);
5. Customer relationship management CRM);
6. Enterprise management systems (ERP);
7. Collaborative systems;
8. Knowledge management systems.

Learning activities and teaching methods:
The overall workload for each student in this course is 108 hours. The distribution of this 105-hour workload amongst the different parts of the course will be announced on the course webpage before the course starts.

Target group:

Prerequisites and co-requisites:
Understanding of the software business, business process modelling, legacy information systems and basics of accounting helps.

Recommended optional programme components:

Recommended or required reading:
Refer to the course webpages
Assessment methods and criteria:
Participation in lectures/exercises/seminars, course assignments, exam.
Grading:

1–5
Person responsible:
Marjo Tiikkaja
Working life cooperation:
No

812651S: ICT and Behaviour Change, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Pasi Karppinen

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits/134 hours of work

Language of instruction:
 English
Timing:
1 st – 2 nd year of Master's and GS ^{3}D studies, autumn semester, period 2

Learning outcomes:
After completing the course the student is able to:

- Analyse methods and techniques that are used for persuasion;
- Apply these in an ethical manner as design guidelines for developing applications, targeting changes in human behaviour or attitudes.

Contents:
Attitudinal theories from social psychology have been quite extensively applied to the study of user intentions and behaviour. These theories have been developed mostly for predicting user acceptance of information technology rather than for providing systematic analysis and design methods for developing software solutions that aim at attitude or behaviour change. At the same time a growing number of information technology systems and services are being developed for these purposes. This course will focus on persuasive technology. It will address the process of designing and evaluating persuasive systems, the types of content and software functionality in such systems, the underlying assumptions behind these, methods for analysing the persuasion context, and principles for persuasive system design. Positive examples of persuasive systems include motivating knowledge workers to do their work better or safer and embracing citizens for healthy living habits. Negative examples are games that inflict addiction. Both sides of influence will be discussed.

Mode of delivery:
Face-to-face teaching, Twitter
Learning activities and teaching methods:
Lectures 27h, independent work 108h (personal reflections 28h, reading for the lectures 20h, assignment 60h)
Target group:

Prerequisites and co-requisites:
Understanding the roles of humans as users and developers of ICT
Recommended optional programme components:

Recommended or required reading:
Research articles, the web, to be announced more specifically during the course implementation.
Assessment methods and criteria:
Participation in the lectures, personal reflection reports, course assignments.
Grading:
 1–5
Person responsible:

Harri Oinas-Kukkonen
Working life cooperation:
No

812335A: Interaction Design, 4 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Kuutti, Kari Pekka Tapani

Opintokohteen kielet: English

ECTS Credits:
4 ECTS credits/108 hours of work
Language of instruction:
English
Timing:
1st year of Master's studies, autumn semester period 2
Learning outcomes:
The course explains the role of human interaction with products and services, explains the factors and problems related to it to motivate interaction design, and teaches some methods for analysis, evaluation and design of interactions.
After completing the course, the student can assess the role of human interaction with information technological products or services and identify factors and problems related to it in a practical design case. The student is able to:
  • use methods for analysis and evaluation of existing interfaces;
  • understand the role of requirements, plan and conduct a simple requirements collection and analysis;
  • use basic principles of usability for graphical user interface design;
  • use interaction design methods to create a novel or redesigned interactive product.
Contents:
The first part provides an overview of interaction design, introducing the key issues and activities of the subject: the terminology and fundamental concepts of the area; the main activities involved in interaction design, and the importance of user involvement in the design process. Part two addresses the key activity in interaction design: establishing requirements for an interactive product and focusing on making the product usable for the intended population. The third part covers the techniques and knowledge necessary to design an interactive product that is accessible and useful to the people who are expected to use it. Part four presents the techniques and knowledge necessary to design and evaluate an interactive product.
Mode of delivery:
Face-to-face teaching / blended teaching
Learning activities and teaching methods:
Lectures 20h, assignments and tutoring or one larger assignment and representation 55h, and exam preparation and exam 33h
Target group:
Master's level students of the IS Oriented Module (compulsory), Master's level students of the SE Oriented Module (optional) and GS3D students (optional)
Prerequisites and co-requisites:
Basic knowledge on human-computer interaction with usability and user-centered design
Recommended optional programme components:

Recommended or required reading:
Sharp, Rogers and Preece (2007, 2nd edition or later edition) Interaction Design: Beyond Human-Computer Interaction
Assessment methods and criteria:
Exam 50%, assignment 50%
Grading:
1-5
Person responsible:
 Kari Kuutti / Anna-Liisa Syrjänen
Working life cooperation:

No

815309A: Real Time Distributed Software Development, 6 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Petri Pulli

Opintokohteen kielet: English

ECTS Credits:
6 ECTS credits/160 hours of work
Language of instruction:
 English
Timing:
1 st year of Master's studies, autumn semester, periods 1 + 2
Learning outcomes:
After completing the course, the student:

• Is able to analyse the characteristics of real-time distributed systems;
• Is able to acquire an object-oriented, model-based approach to solve the design problems found in real-time systems;
• Is able to detect and derive specific problems facing the real-time software designer, and to suggest design patterns to solve those problems.

Contents:
Introduction
1. Characteristics of real-time systems;
2. Resource management;
3. Safety and reliability;
4. Time constraints;
5. Concurrency;
6. Scheduling;
7. Multitasking, interrupts;
8. Hardware interfaces.
Characteristics of Distribution
1. Centralised;
2. Client-server;
3. Clusters ;
4. Cloud;
5. Peer-to-peer;
6. Ad hoc;
7. Concept of time;
8. Synchronisation;
9. Latency and jitter;
10. Quality of service;
11. Service discovery;
12. Networking primitives;
13. Networking platforms.

Real-Time UML Modelling Methodology
Real-Time Design Patterns
Design Examples: Embedded, Ubiquitous, Mobile, Web/Internet
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 45h, design exercises 15h, student projects 100h.
Target group:

Prerequisites and co-requisites:
Student understands computer architecture, object-oriented analysis and design (UML), programming language C and/or Java.
Recommended optional programme components:

Recommended or required reading:
Lecture notes based on reference books
• Douglass B.P. (2007) Real-Time UML – Advances in the UML for Real-Time Sys-tems. Third edition. Addison-Wesley ISBN 0-321-16076-2. 694 p.
• Douglass B.P. (2009) Real-Time Design Patterns – Robust Scalable Architecture for Real-Time Systems. Addison-Wesley ISBN 0-201-69956-7. 500 p.
Assessment methods and criteria:
Exam and project evaluation.
Grading:
 1–5
Person responsible:
Petri Pulli
Working life cooperation:
No

813630S: Software Business Development, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits/134 hours of work

Language of instruction:
 English
Timing:
The course unit is held in the autumn semester, during period 2. It is recommended to complete the course in the first or second year of Master's studies.

Learning outcomes:
The course provides insights to business development on a business, company and industry level. After completing the course, the student is able to plan how business is being developed over the whole life cycle of the business and company, conduct market and business analyses, identify different sources of financing for business operation, evaluate different strategic business options and select a business model adequate for the present and future situation of the company.
Contents:
The course takes three points of view: company start-up, established business, and software industry. The course introduces the concepts of business idea, business plan, software business models and strategies, and the software value network.

Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
Lectures 24h, exercises 12h, course assignments 78h, exam 20h. The course assignments will be conducted as group work.

Target group:

Prerequisites and co-requisites:

The recommended prerequisite is the completion of the following courses prior to enrolling for the course unit: 811174P Introduction to Software Business, 813316A Business Process Modelling and 813620S Software Business and IT Management.

Recommended or required reading:
Refer to the course web pages

Assessment methods and criteria:
This course unit utilizes continuous assessment. Lectures are for the most part voluntarily, but participation is recommended. The students will write course assignments which will be assessed. In addition, there will be an exam at the end of the course which will be assessed. The assessment of the course unit is based on the learning outcomes of the course unit.

Grading:
 1–5
Person responsible:
 Karin Väyrynen
Working life cooperation:
No

815310A: Software Production and Maintenance, 4 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Saukkonen, Samuli

Opintokohteen kielet: English

ECTS Credits:
4 ECTS credits/108 hours of work
Language of instruction:
English
Timing:
1st year of Master's and GS3D studies, spring semester, period 3

Learning outcomes:
After completing the course, the student:

- Can apply the framework of product line engineering in large scale software production;
- Can apply the maintenance process and techniques in software production.

Contents:
Product line engineering
   1. Product line variability;
   2. Domain engineering;
   3. Application engineering;
   4. Transition strategies and organisational issues.
Software maintenance
   1. Categories of maintenance;
   2. Corrective maintenance;
   3. Other forms of maintenance.

Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 20h, study group working and weekly discussion sessions with the teacher on 8 assignments, together with report writing, 88h.
Target group:

Prerequisites and co-requisites:
Basic knowledge of software engineering and software architectures.

Recommended optional programme components:

Recommended or required reading:
- Pohl, K., Böckle, G., van der Linden, F. Software Product Line Engineering. Foundations, Principles, and Techniques, Springer-Verlag, 2005; chapters 1-5, 10, 15, 19-20.
- Chastek G.J., Donohoe P., McGregor J.D., Formulation of a Production Strategy for a Software Product Line, Technical Note CMU/SEI-2009-TN-025, Carnegie Mellon, 2009
- Gopalaswamy, R., Ramesh, B., Software maintenance: effective practices for geographically distributed environments, Tata McGraw-Hill, 2006 - Computers - 456 pages; chapters 1-6.

Assessment methods and criteria:
Active participation: 8 weekly assignments to be assessed separately. The final grade will be the sum of all assignments. "Conventional" participation: written exam.

Grading:
1–5
Person responsible:
Samuli Saukkonen
Working life cooperation:
No

815311A: Software Quality and Testing, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Leikkaavuudet:

ay815311A   Software Quality and Testing (OPEN UNI)   5.0 op

ECTS Credits:
5 ECTS credits/134 hours of work
Language of instruction:
English
Timing:
1 st year of Master's studies, autumn semester, period 1
Learning outcomes:
The student understands different views on software quality and the role of reviews, inspection and testing as a part of software engineering and defect removal techniques. The student can conduct the review as part of review team and use an appropriate supporting tool. The student knows testing levels, strategies and techniques, can create test cases and conduct unit testing with appropriate testing tools. The student knows the possibilities of test driven development, test automation and models for reviewing.
Contents:
Software quality and quality assurance. Software reviews and inspection. Fundamental concepts of software testing. Software testing techniques. Test-driven development. Test automation.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 32h, study group working 24h, paper reading 24h, exercises 24h, report writing 30 h
Target group:

Prerequisites and co-requisites:
Basic knowledge of software engineering, knowledge of Java programming language.
Recommended optional programme components:

Recommended or required reading:

To be announced during the course implementation but initially planned to be:
- Pezze M.,Young M., "Software Testing and Analysis: Process, Principles and Tech-niques", John Wiley&Sons, 2008
- A. P. Mathur, "Foundations of Software Testing", Prentice Hall, 2008
- Paul Ammann, Jeff Offutt, "Introduction to Software Testing", Cambridge University Press, 2008
- Kent Beck, "Test-Driven Development by Example", Addison-Wesley, 2002
- Lasse Koskela, "Test Driven: Practical TDD and Acceptance TDD for Java Devel-opers", Manning Publications, 2007
- Galin D., "Software Quality Assurance: From theory to implementation", Addison-Wesley, 2004

Assessment methods and criteria:
Report and exercise evaluation, active and regular attendance to lectures and exercises.
Grading:
1–5
Person responsible:
 Ayse Tosun Misirli
Working life cooperation:
No

812671S: Usability Testing, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Mikko Rajanen

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits/134 hours of work

Language of instruction:
English and Finnish
Timing:
1 st – 2 nd year of Master's studies, spring semester, periods 3 and 4

Learning outcomes:
After completing the course, the student can:

- Design and follow through a usability testing process;
- Design usability test scenarios and tasks;
- Select test subjects;
- Plan and follow through usability tests as laboratory tests or field tests;
- Analyse and report the findings from usability tests.

Contents:
Basic terms and types of usability testing, usability tests process, usability test tasks and scenarios, test subjects, following through a usability test, analysing usability test material, reporting the findings from usability tests.

Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 24h, assignment tutoring 13h, assignment 90h, seminar 7h.
Target group:

Prerequisites and co-requisites:
Student is familiar with most common user interface design terms, design and evaluation methods as in "811379A Introduction to Human-Computer Interactions" course.
Recommended optional programme components:

Recommended or required reading:
Structure and contents of the course are based on:

- Dumas, J. S. & Redish, J. C. (1993): A Practical Guide to Usability Testing. Ablex Publishing Corporation.
- Rubin, J. (1994): Handbook of Usability Testing: How to Plan, Design, and Conduct Effective Tests. Chichester: John Wiley & Sons, Inc.

Assessment methods and criteria:
Assessment of the course is based on the learning outcomes of the course based on the written usability test plan, supervised usability tests, written usability test report and oral seminar presentation

Grading:
 Pass/fail
Person responsible:
Mikko Rajanen
Working life cooperation:
No
Other information:
Work placements: No

Tutkintorakenteisiin kuulumattomien opintokokonaisuuksien ja -jaksojen kuvaukset

300002M: Advanced Information Skills, 1 op

Voimassaolo: 01.08.2009 -

Opiskelumuoto: Other Studies

Laji: Course

Vastuuyksikkö: Faculty of Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Sassali, Jani Henrik

Opintokohteen kielet: Finnish

ECTS Credits:
1 credit
Language of instruction:
Finnish
Timing:
Recommend to degree students who are working on their diploma/master's thesis. The course unit is held once in the autumn and once in the spring semester.
Learning outcomes:
Students know the different phases of scientific information retrieval process and basic techniques of systematic information search. They will find the most important reference databases of their discipline and know how to evaluate information sources and search results.
Contents:
Scientific information retrieval, evaluation of search results and information sources, information search on subject areas of diploma/master's thesis.
Mode of delivery:
Blended teaching: lectures, web-based learning material and exercises in Optima environment, personal guidance
Learning activities and teaching methods:
Lectures 6-12h, self-study 20h, personal guidance 1h
Target group:
The course is optional for students of the Faculty of Science and the Faculty of Technology.
Prerequisites and co-requisites:
-
Recommended optional programme components:
-
Recommended or required reading:
Parts from the following chapters of the Toolbox of Research: https://wiki.oulu.fi/display/jotut/1.
1+Tieteellinen+tiedonhankinta, https://wiki.oulu.fi/display/jotut/1.3.1+Tieteellisiin+julkaisuihin+pohjautuva+arviointi
Assessment methods and criteria:

Passing the course requires participation in the lectures (6h) and personal guidance and successful completion of the course assignments.
Grading:
pass/fail
Person responsible:
Science and Technology Library Tellus, tellustieto (at) oulu.fi
Working life cooperation:
-
Other information:
-

811336A: Collective capabilities and information processing, 1 - 5 op

Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Department of Information Processing Science
Arvostelu: 1 - 5, pass, fail
Opettajat: Anna-Liisa Syrjänen
Opintokohteen kielet: Finnish

ECTS Credits:
1-4 ECTS credits/27-108 hours of work
Language of instruction:
Finnish
Timing:
Free

Learning outcomes:
After completing the course, a student is able to identify the features of cooperation within some information processing tasks and analyse his or her experiences for development of cooperation in practice.
Contents:

Group work coordination, cooperative workshops or tutoring related to some information processing tasks, and analysis of his or her own experiences and reporting.
Mode of delivery:
Blended teaching
Learning activities and teaching methods:
Introduction, plan of action for cooperative activities, organisations, and reporting and or presentation of the organized cooperation.
Target group:

Prerequisites and co-requisites:
Good knowledge on course areas selected for cooperation, workshops or tutoring.
Recommended optional programme components:

Recommended or required reading:
Literature of selected course area and cooperation, coordination or tutoring.
Assessment methods and criteria:
A plan of action and a report and or a presentation of the organized cooperation.
Grading:
Pass / fail.
Person responsible:
Anna-Liisa Syrjänen
Working life cooperation:
No

814602S: Design and Analysis of Computer Algorithms, 5 op

Voimassaolo: 01.08.2011 - 31.10.2012

Opiskelumuoto: Advanced Studies

Laji: Course

Arvostelu: 1 - 5, pass, fail

Opettajat: Juha Kortelainen

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits/134 hours of work
Language of instruction:
English
Timing:
1 st – 2 nd year of Master's studies, autumn semester, period 1

Learning outcomes:
After completing the course, the student understands and internalises the phases that are needed when designing and analysing a computer algorithm. They are able to choose an appropriate design technique for a given simple problem, apply the chosen technique and specify the respective algorithm. Moreover, the student is capable of analysing the time and space complexity of the algorithm as well as its simplicity and generality. Finally they can implement the algorithm with a programming language.
Contents:
1.   Mathematical background
2.   Asymptotic analysis
3.   Divide and conquer algorithms
4.   Greedy algorithms
5.   Dynamic programming
6.   Graph algorithms
7.   NP-hard problems
8.   Linear programming
9.   Approximation algorithms
10.   Randomised algorithms
Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
Lectures 35h, exercises 35h, autonomous work 64h.
Target group:

Prerequisites and co-requisites:
Basic knowledge in discrete mathematics, data structures and algorithms, rudimentary skills in programming.
Recommended optional programme components:

Recommended or required reading:
1. Lecture notes
2. Lecture slides
3. Exercise materials
4. Text book: Steven S. Skiena: The Algorithm Design Manual, 2nd ed., Springer-Verlag, London, 2008.

Assessment methods and criteria:
Either two partial exams or a single final exam.

Grading:
 1–5
Person responsible:
  Juha Kortelainen
Working life cooperation:
No

816663S: Designing Secure Systems and Software, 5 op

Voimassaolo: 01.08.2011 - 31.10.2012

Opiskelumuoto: Advanced Studies

Laji: Course

Arvostelu: 1 - 5, pass, fail

Opettajat: Mikko Siponen

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits/134 hours of work

Language of instruction:
 English

Timing:
1 st – 2 nd year of Master's studies, autumn semester, period 1

Learning outcomes:
After completing the course, the student:

- Can use different methods for designing secure systems and software;
- Understands the strengths and limitations of these methods;
    - Can integrate these methods into information systems and software development methods.

Contents:
1. Introduction to the development of secure systems;
2. Problems in the development of secure systems and software;
3. Brief overview of the different methods for the development of secure systems and software;
4. Strength and weaknesses of these methods;
5. Application of selected method(s) for the designing of systems and software by integrating them to the system development process.

Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
Lectures 28h, and exercises 16h, reading for the examination and exercise work 90h.

Target group:

Prerequisites and co-requisites:
Course "811168P Introduction to Information Security" or equivalent knowledge, a course on information system and software development.

Recommended optional programme components:

Recommended or required reading:
Articles, to be announced later.

Assessment methods and criteria:
 Examination.

Grading:
 1–5.

Person responsible:
 Mikko Siponen

Working life cooperation:
No

811600S: Emerging Trends in Software Engineering, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

ECTS Credits:
5 ECTS
Language of instruction:
Language of instruction: English
Timing:
Timing: 1 st – 2 nd year of Master's studies, autumn semester, period 1
Learning outcomes:
Objective: This advanced special track on SE focuses on current research topics, which are not covered sufficiently in the core curriculum. The content of the courses may vary in yearly implementations depending on the lecturers and advances in the field.

Learning Outcomes: After completion of the course, the student can analyse and evaluate different research approaches on distributed software engineering.
Contents:
Contents: Emerging Trends in Software Engineering such as

- Open Source Software Engineering
- Global Agile Software Engineering
- Sourcing (Out/Near/…)

Learning activities and teaching methods:
Mode of delivery: To be defined during the course implementation. Typically, this is a seminar style course with introductory lectures, reading and analysing of articles and writing of reports. The overall workload for each student in this course is 135 hours.
Target group:
Target group: all Master's level and GS ^{3}D students (optional)
Recommended optional programme components:
Prerequisites: Good general knowledge of software engineering practices.
Recommended or required reading:
Study materials: To be announced during the course implementation.
Assessment methods and criteria:
Assessment methods: To be announced during the course implementation.
Grading:
Grading: Pass/fail or 1–5: to be defined during the course implementation.
Person responsible:
Responsible person: professors in software engineering
Other information:
Not implemented during academic year 2011–2012

813614S: Information Processing and Collective Capabilities, 1 - 4 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Anna-Liisa Syrjänen

Opintokohteen kielet: Finnish

ECTS Credits:
1-4 ECTS credits/27-108 hours of work
Language of instruction:
Finnish
Timing:
Free

Learning outcomes:
After completing the course, a student is able to identify the features of cooperation within some information processing tasks and analyse his or her experiences for development of cooperation in practice.
Contents:
Group work coordination, cooperative workshops or tutoring related to some information processing tasks, and analysis of his or her own experiences and reporting.

Mode of delivery:
Blended teaching
Learning activities and teaching methods:
Introduction, plan of action for cooperative activities, organisation, and reporting and or presentation of the organized cooperation.
Target group:

Prerequisites and co-requisites:
Good knowledge on course areas selected for cooperation, workshops or tutoring.
Recommended optional programme components:

Recommended or required reading:
Literature of selected course area and cooperation, coordination or tutoring.
Assessment methods and criteria:
A plan of action and a report and or a presentation of the organized cooperation.
Grading:
Pass / fail.
Person responsible:
Anna-Liisa Syrjänen
Working life cooperation:
No

813605S: Pro gradu thesis (minor subject), 21 op

Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Department of Information Processing Science
Arvostelu: A,B,N,C,M,EX,L
Opintokohteen kielet: Finnish

ECTS Credits:
21 ECTS credits/560 hours of work.

Language of instruction:
Finnish/English
Timing:
free
Learning outcomes:
After completing the thesis the student can:
- Define a relevant focused problem in the field of information processing science;
- Apply scientific method as a tool in solving the stated research problem;
- Synthesise research results and evaluate their validity;
- Write a scientific thesis based on the accomplished research according to the department's guidelines;
- Participate in the evolution of ICT and postgraduate studies after completing the thesis.

Mode of delivery:
Face-to-face meetings and electronic communication with the supervisor.

Learning activities and teaching methods:
Conducting and reporting research under supervision of personal advisor.
Target group:
Minor students
Prerequisites and co-requisites:
The research plan and the final draft of the thesis will be presented in the "Master's thesis seminar" (813602S).
Grading:
The supervisor and a second independent reviewer will evaluate the thesis by using the scale 1–5.
Person responsible:
Professors and other teachers/thesis advisors in the department.
Working life cooperation:
Especially empirical Master's theses are often done in cooperation with private or public sector.

814660S: Program Correctness, 5 op

Voimassaolo: 01.08.2011 - 31.10.2012
Opiskelumuoto: Advanced Studies
Laji: Course
Arvostelu: 1 - 5, pass, fail
Opettajat: Antti Siirtola
Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits/134 hours of work
Language of instruction:
 English
Timing:
1 st – 2 nd year of Master's studies, autumn semester, period 1

Learning outcomes:
After completing the course, the student can list and classify methods and tools available for formal verification. She/he can compare the strengths and limitations of the approaches of a different kind and is able to choose a suitable method for a verification task at hand. More specifically, the student is capable of formulating specifications in propositional, predicate and temporal logic and modelling systems in predicate logic and as finite-state machines. She/he can apply model checking in the analysis of concurrent systems and invent invariants and use proof calculus to establish the (partial) correctness of sequential algorithms.

Contents:
1. Propositional logic;
2. Predicate logic;
3. Micro models of software;
4. Temporal logic;
5. Model checking;
6. Partial and total correctness;,
7. Proof rules for program correctness;,
8. Programming by contract.

Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
Lectures 32 hours, exercises 24 hours, autonomous work 78 hours
Target group:

Prerequisites and co-requisites:
The successful completion of the course necessitates programming skills and the basics of logic and graph algorithms. In terms of courses, it means introduction to programming, discrete structures, data structures and algorithms.
Recommended optional programme components:

Recommended or required reading:
1. Text book: Michael Huth, Mark Ryan: Logic in Computer Science. Modelling and Reasoning about Systems (Chapters 1-4). Cambridge University Press, 2004, 2. lecture material, 3. exercise material.
Assessment methods and criteria:
By taking either three partial exams or a single final exam

Grading:
1-5
Person responsible:
Antti Siirtola
Working life cooperation:
No

812670S: The Next Generation of the Web, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Oinas-Kukkonen, Harri Ilmari

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits/134 hours of work
Language of instruction:
  English
Timing:
1 st – 2 nd year of Master's studies, autumn semester, period 1
Learning outcomes:
After completing the course the student is able to:

- Analyse issues related to the development web and perhaps even to predict the potential future of the web;
- Apply these for web design, organisational purposes and entrepreneurial activities.

Contents:

The course will help the student to recognise and reflect on on-going and potential future web development trends. It will build upon understanding of the contemporary web, its conceptual background, and the changes that lead to the web we see today. The ultimate goal for the course is to foresee the potential future of the web in the upcoming five years. Thus, the name of the course is The Next Generation of the Web.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures/seminars 27h, independent work 107h
Target group:

Prerequisites and co-requisites:
Course "813619S Emerging Technologies and Issues" (recommended).
Recommended optional programme components:

Recommended or required reading:
Scientific articles, the web. More sources to be announced specifically during the course implementation.

Assessment methods and criteria:
Participation in the lectures, student paper

Grading:
  1–5
Person responsible:
  Harri Oinas-Kukkonen
Working life cooperation:
No