

Opasraportti

LUTK - Department of Information Processing Sciences 2010-11 (2010 - 2011)

DEGREE PROGRAMME IN INFORMATION PROCESSING SCIENCE

Information technology is part of our everyday life: new products and services all contain information technology in different forms. Information industry has become third biggest industry in Finland in addition to forestry and metallurgy. Fastest growing branches in information industry are wireless communication, content production for new media and software development. These branches are also extremely international. Skills and knowledge required in these areas are taught in the study programmes of the Information Processing Science. The factor limiting the growth in information industry is the lack of experts in research, development and marketing of information technology products. Information Processing Science offers you practically unlimited opportunities!

Research in information processing is not only connected to software products and services. It is equally important to study how information technology can support the working of people and organizations in varying situations and how software business can be developed in the global market.

Graduates of Information Processing Science find employment. Work opportunities abound in companies, public sector and in university research projects. A graduate with a Master degree in Information Processing Science can have a career with both expert and managerial positions. International companies offer international career opportunities.

Specialisation options and the degree

Students graduate first with a Bachelor Degree (180 credits) in Science and can then continue to take the Master Degree (120 credits) in Science. A little less than half of the studies at the Bachelor level are mandatory/compulsory basic studies for all students. The optional study units are chosen based on the student's career and specialization plans and lay the foundation for the deepening units in the Master Degree programmes. The Bachelor degree provides basic skills for work in information processing jobs.

The Master Degree consists of mandatory/compulsory studies (little less than 50% of the whole programme), of studies connected to the student's chosen specialization and of recommended and fully optional studies. The Master Degree programme offers the student powerful tools to build his/her professional profile through specialization studies, recommended studies, optional studies, graduate thesis, work experience and through studies in a minor subject.

The Degree Programme in Information Processing Science offers five specialization options: Information Systems, Software Engineering, Software Business, Digital Media and Mobile Services.

The student can freely choose the specialization option according to his/her interest. However, it is important to notice that for a successful completion of the specialization courses often requires previous knowledge and skills which should be acquired during the bachelor studies.

Tutkintorakenteisiin kuulumattomat opintokokonaisuudet ja -jaksot

300002M: Advanced Information Skills, 1 op
 817607S: Advanced Topics on Information Systems and Software Engineering, 8 op
 811386A: Algorithms, 5 op
 811383A: Bachelor Thesis, 7 op
 812336A: Basics of C++ Programming Language, 6 op
 811380A: Basics of Databases, 7 op
 811379A: Basics of Human Computer Interaction, 5 op
 811108P: Basics of Project Work and Management, 3 op

Compulsory

811108P-01: Project Management Principles, exercise work, 0 op
 811108P-02: Project Management Principles, exam, 0 op
 811147A: Basics of Statistical Data Analysis for Information Processing Science, 4 op
 815651S: Business Applications in Mobile Networks, 7 op
 813316A: Business Process Modeling, 5 op
 811336A: Collective capabilities and information processing, 1 - 5 op
 815618S: Component-based Software Production, 6 op
 810124P: Computer Architecture, 6 op
 811355A: Computer Ethics, 3 op
 813319A: Creation of business opportunities in software business, 5 op
 811312A: Data Structures and Algorithms, 5 op
 815340A: Data security in wireless communication, 5 op
 811384A: Database systems, 4 op
 813318A: Dimensions of software entrepreneurship, 5 op
 811120P: Discrete Structures, 5 op
 817610S: Doing Software Business in China, 5 op
 813353A: Electronic Commerce, 4 op
 813616S: Globalized software company, 6 op
 811171P: Humans as Users and Developers of Information Technology, 4 op
 815348A: ICT Standardization, 6 op
 817604S: ICT and Organizational Change, 5 op
 813614S: Information Processing and Collective Capabilities, 1 - 4 op
 811168P: Information Security, 5 op

Compulsory

811168P-01: Information Security, exercise work, 0 op
 811168P-02: Information Security, exam, 0 op
 030005P: Information Skills, 1 op
 812644S: Information System Applications, 5 op
 812304A: Information Systems in Organizations, 6 op
 811327A: Information security management, 5 op
 812334A: Information systems planning, 6 op
 813601S: Information systems theory, 10 op
 812335A: Interaction Design, 4 op
 817601S: International ICT Business, 5 op
 811338A: Internet and Computer Networks, 5 op
 810136P: Introduction to Information Processing Sciences, 5 op
 811170P: Introduction to Information Systems Analysis and Design, 6 op
 811169P: Introduction to Information Systems Design, 6 op
 811122P: Introduction to Programming, 5 op
 811174P: Introduction to Software Business, 5 op
 811382A: Introduction to research work, 4 op
 812641S: Location and Context Based Services, 5 op
 811387A: Mac OS X Programming, 4 op
 813620S: Managing Software Business, 5 op
 813602S: Master's thesis seminar, 2 op
 815639S: Methods for Designing Secure Information Systems, 6 op
 815349A: Mobile Internet Service Architecture, 7 op
 815645S: Mobile Research, 10 op
 811359A: Mobile Systems Programming, 6 op
 812337A: Net Culture, 4 op
 811354A: Networks Security, 5 op
 811356A: New Media, 5 op
 813324A: New Product Development in Software Company, 5 op
 812346A: Object Oriented Analysis and Design, 6 op

812347A: Object-Oriented Programming, 6 op
 815653S: Open Source Software Development, 4 op
 810029Y: Orientation studies, 3 op
 815301A: Parallel programming, 5 op
 813611S: Personal software process, 6 op
 812642S: Personalisation, profiling and segmentation for mobile, 5 op
 811173P: Principles of Information Security, 4 op
 813606S: Pro gradu thesis, 30 - 35 op
 813605S: Pro gradu thesis (minor subject), 21 op
 811176P: Programming Assignment, 2 op
 811175P: Programming Assignment I, 2 op
 812316A: Programming in C, 4 op
 814601S: Progressive sandwich training, 5 op
 811365A: Project I, 7 op
 812631S: Project II, 14 op
 817613S: Project Management in Global Environments, 5 op
 817606S: Project in Distributed Global Context, 11 op
 811330A: Project management, 5 op
 812340A: Real Time Software Design, 6 op
 811391A: Requirements Construction, 5 op
 813621S: Research Methods, 5 op
 814644S: Research on digital media, 10 op
 813325A: Sales Strategies in Software Business, 5 op
 816630S: Scientific paper writing, 1 - 3 op
 814340A: Small-Group Tutoring, 3 op
 812315A: Software Construction, 10 op
 817602S: Software Development in Global Environment, 5 op
 813323A: Software Quality and Quality Techniques, 3 op
 813322A: Software Testing, 3 op
 815347A: Software architectures, 6 op
 813608S: Software business case studies, 6 op
 813315A: Software business planning, 5 op
 815623S: Software development with business objects, 5 - 6 op
 811335A: Software engineering, 6 op
 815608S: Software engineering research, 10 op
 813612S: Software process improvement, 5 op
 811388A: Symbian Programming, 4 op
 817603S: Systems Design Methods for Global Information Systems, 5 op

Compulsory

817603S-01: Systems Design Methods for Global Information Systems, exercise work, 0 op
 817603S-02: Systems Design Methods for Global Information Systems, exam, 0 op
 811390A: Unix Programming, 4 op
 813352A: Usability Testing, 5 op
 817605S: User Information in Service Design, 5 op
 811375A: User Interface Programming, 5 op
 811345A: Web-information Systems Design, 5 op
 811389A: Windows Programming, 4 op

Opintojaksojen kuvaukset

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

Ei opintojaksokuvauksia.

817607S: Advanced Topics on Information Systems and Software Engineering, 8 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

811386A: Algorithms, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Ari Vesanen

Opintokohteen oppimateriaali:

Cormen, Thomas H. , , 1990

Opintokohteen kielet: Finnish

811383A: Bachelor Thesis, 7 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

7 ECTS

Timing:

3rd year, periods 2+3+4

Learning outcomes:

Objective: Practice all phases of research work: planning, collection and organising of materials, analysis of materials, reporting, reflection.

Learning Outcomes: Student understands the content of major phases of a research process: planning of the content and process, selection and delineation of a research topic, collection of research materials, analysis of materials, reporting of research, and reflection. Student has practiced basic skills as information search, reading of scientific texts and building up expertise on a topic, source criticism, and correct use of references, production of a scientific text, and scientific thinking. Student understands the role of planning and supervision in the process.

Student is capable to produce and report a scientific study. Student knows typical challenges related to a research process, and understands the uncertainty and open-endedness involved.

Contents:

Student plans and produces a literature-based scientific study under supervision.

Learning activities and teaching methods:

Planning of the content and process. Meetings with the supervisor. Researching and writing the theses. Dependent on the supervisor, group meetings with other theses writing students.

Target group:

3rd year

Recommended optional programme components:

Compulsory studies (about 60 ECTS) ready. Recommended to start theses work in connection and immediately after the course Introduction to research work. Maturity test will be written about a topic related to theses.

Recommended or required reading:

Guide to thesis writing and correct use of references. Material collected by the student.

Assessment methods and criteria:

: Evaluation of theses.

Grading:

1-5

Person responsible:

Kari Kuutti

812336A: Basics of C++ Programming Language, 6 op

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

Timing:

4th year, periods 2+3

Learning outcomes:

Objective: The course covers object-oriented programming in C++ programming language. Also generic programming and C++ Standard Template Library is discussed.

Learning Outcomes: Knowing the syntax of C++. Knowing how to construct programs in C++ using object-oriented programming paradigm. Familiarity with other programming paradigms. Knowing the basics of C++ standard and its basic data types, classes, and libraries.

Ability to construct object-oriented programs in C++ and to apply basic features of Standard Template Library in the programs.

Contents:

1. Introduction to C++, 2. Object-based programming, 3. Dynamic memory allocation, 4. Generic programming, 5. Input, output and IOStream library, 6. Object-oriented programming, 7. Exception handling, 8. Multiple inheritance, 9. Polymorphic containers, 10. Patterns related to object creation.

Learning activities and teaching methods:

Lectures and exercises.

Target group:

4th year

Recommended optional programme components:

Object-oriented Software Development and Programming Assignment I

Recommended or required reading:

Bruce Eckell: Thinking in C++ (vol 1 and vol 2) (<http://www.nic.funet.fi/pub/mirrors/www.mindview.net/Books/>) relevant parts.

Assessment methods and criteria:

Exam and programming assignment.

Grading:

1-5 (determined by exam)

Person responsible:

Ari Vesanen

811380A: Basics of Databases, 7 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: lisakka, 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:

4 ECTS

Timing:

2nd year, periods 2+3

Learning outcomes:

Objective: The course does relational databases, conceptual modelling of data-bases, as well as XML and object databases.

Learning Outcomes: After finishing the course the student understands data-bases - especially relational, XML and object-oriented databases. Moreover, student can model a database.

Contents:

Conceptual modelling (ER- and EER-diagrams); Relational model (theory, databases, query techniques and normalisation); XML-databases; object-oriented databases; transactions.

Learning activities and teaching methods:

Lectures (in Finnish), compulsory exercises and assignments (English available).

Target group:

2nd year

Recommended optional programme components:

Object oriented analysis and design -course or knowledge about object oriented class model.

Recommended or required reading:

Silberschatz, Korth & Sudarshan: Database system concepts

Assessment methods and criteria:

A way to pass will be informed in course web pages.

Grading:

1-5

Person responsible:

Juha lisakka

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

Timing:

2nd year, period 1

Learning outcomes:

Objective: A course provides basic user interface design and usability knowl-edge.

Learning Outcomes: Student is familiar with most common user interface de-sign terms, design and evaluation methods and has some practical experience in their applying.

Contents:

Terms, user interface types, interaction models and context, elements and navigation related to common windowed systems, interaction design basics, process, design rules, evaluation techniques, universal design and user support.

Learning activities and teaching methods:

Information session or lectures, reading up on course materials, assignment and course book exam.

Target group:

2nd year

Recommended optional programme components:

Humans as Users and Developers of Information Technology (811171P).

Recommended or required reading:

Dix et al. (2004, 3. edition) Human-Computer Interaction or related course books and materials.

Assessment methods and criteria:

A course book exam or an essay and an assignment on user interface design and usability evaluation.

Grading:

1-5

Person responsible:

Anna-Liisa Syrjänen

811108P: Basics of Project Work and Management, 3 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:

811366A Project Work 10.0 op

Ei opintojaksokuvauksia.

Compulsory

811108P-01: Project Management Principles, exercise work, 0 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Basic Studies

Laji: Partial credit

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

811108P-02: Project Management Principles, exam, 0 op**Voimassaolo:** 01.08.2010 -**Opiskelumuoto:** Basic Studies**Laji:** Partial credit**Vastuuyksikkö:** Department of Information Processing Science**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Kokkonieniemi, Jouni Kalevi**Opintokohteen kielet:** Finnish

Ei opintojaksokuvauksia.

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

Ei opintojaksokuvauksia.

815651S: Business Applications in Mobile Networks, 7 op**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Department of Information Processing Science**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Olli Martikainen**Opintokohteen kielet:** Finnish**ECTS Credits:**

7 ECTS

Timing:

4th - 5th year and PhD students, limited participation, period 2

Learning outcomes:

Objective: The course introduces Open Source Software (OSS) paradigm and current topics of OSS research. The aim is to study from different viewpoints, for example, what OSS is and what it is not, the history and organization of OSS projects, methods to switch OSS development and usage, as well as licensing models and possible risks. The emphasis is on research work.

Learning Outcomes: After passing the course, a student will be able to define the historical background and the ideology of OSS. The student will be able participate in OSS project, as well as evaluate the impact of the usage of OSS and licenses on software development and exploitation. In addition, the student will be able to view the phenomenon through the essential scientific research.

Contents:

Understanding Business Value, NPV, IRR, Productivity, Project and business planning, Strategy, Value Chains, Competitive Advantage, Understanding the Enterprise, Process Architecture and Organizational Alignment, Process Modeling, Measuring Process Performance with different Metrics, Understanding Process Problems, Processes Improvement, Software Tools in Process Modeling and Analysis, Case studies and exercises.

Learning activities and teaching methods:

Lectures, exercises, case project in the field to model and improve given process, project report and its seminar presentation

Target group:

4th- 5th year

Recommended optional programme components:

815349A Mobile Internet Services and Architectures

Recommended or required reading:

Lectures, course book and chosen scientific articles.

Assessment methods and criteria:

Presence in lectures, exercises, case project, its report and seminar presentation. Also possible to take examination, model and analyze a process and its improvements and write a report on the results.

Grading:

Exercises, case project, project report and its seminar presentations.

Person responsible:

Olli Martikainen

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

Ei opintojaksokuvauksia.

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

Timing:

Free, 3rd -n year or Master of Science students.

Learning outcomes:

Objective: Recognizing, sharing and development of collective capabilities within information processing studies and tutoring.

Learning Outcomes: Student recognizes and puts to the test some proficiency in areas of information processing and aims to develop it in co-ordination with others.

Contents:

Recognizing the know-how area for tutoring, plan of action, organizing, observing, reflection of own learning outcome and reporting.

Learning activities and teaching methods:

Kick off, info or guidance sessions, plan of action, organizing and documenting tutoring, intermediate/end reporting and feedback session.

Target group:

3rd -n year or Master of Science students.

Recommended optional programme components:

Good knowledge on course areas selected for tutoring activity.

Recommended or required reading:

Ackerman et al. (2003) Sharing expertise; Clemmensen, T. (2005) Community knowledge in an emerging online professional community, Knowledge and Process Management 12(1) 43-52; Orlikowski, W. (2002) Knowing in practice: Enacting a collective capability in distributed organizing. Organization Science 13(3): 249-273; <http://tutkimus.parvi.fi/index.php/Lähteitä> and course materials of Information Processing Science.

Assessment methods and criteria:

Tutoring plan, intermediate and end reports.

Grading:

Pass / fail.

Person responsible:

Anna-Liisa Syrjänen

815618S: Component-based Software Production, 6 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Krzanik Lech

Opintokohteen kielet: Finnish

ECTS Credits:

6 ECTS

Timing:

4th year, period 4

Learning outcomes:

Objective: The objective of this advanced course is to provide component-based software development concepts and methods. A wide range of common component models and techniques are discussed. The focus is on object oriented component systems.

Learning Outcomes: On completing the course the students are prepared to develop modular, flexible and reusable component software.

Contents:

Component software foundations, reusability, components and interfaces, component patterns and styles, product lines, application frameworks, COTS-based systems. Software product management, component project management, agile component software development. EJB, .NET, services and other component platforms, EAI platforms. Component software development capability maturity models.

Learning activities and teaching methods:

Lectures, exercises, hands-on assignment, examination.

Target group:

4th year

Recommended optional programme components:

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, 815347A Software architectures)

Recommended or required reading:

Clemens Szyperski, Component Software: Beyond Object-Oriented Programming. Addison-Wesley, 2003; Web-pages (<http://www.tol.oulu.fi/users/lech.krzanik/cbsd.htm>).

Assessment methods and criteria:

Lectures, exercises, assignment, examination are evaluated on a point scale. Minimum levels: weekly exercises: 50% of tasks; assignment: pass.

Grading:

The normal grading scale is used. Active participation to exercises, approved assignment, and a positive examination result are necessary to pass the course.

Person responsible:

Lech Krzanik

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:

5 ECTS

Timing:

1st year, period 3

Learning outcomes:

Objective: The course gives an overview of the programs' running platform that consists of computer hardware, network interfaces and device drivers. The approach of the course is abstraction thinking. The components of the complex running platform are perceived as layered system architecture. The course teaches the structure of architecture layers, mechanisms, running semantics and tasks, and determination and compatibility of critical properties (performance, security, power consumption). The main focus of the course is on PC computer architecture, but also laptops and mobile computers are examined.

Learning Outcomes: Understanding and managing the programs' running platform: performance, resource demand, error situations.

Provide concepts and terminology to understand software development.

Helps especially hardware programming: embedded programming, mobile systems, multimedia, scientific calculation.

Be able to manage computers like a professional in student's first job.

Contents:

1. Basics of digital logics and components of a processor
2. Display formats of Digital information
3. Processor and its functions
4. 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

Learning activities and teaching methods:

Lectures (only in Finnish), home exercises, laboratory exercises, examination

Target group:

1st year

Recommended optional programme components:

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Recommended or required reading:

Study materials:

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:

Antti Alasalmi

811355A: Computer Ethics, 3 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Mikko Siponen

Opintokohteen kielet: Finnish

ECTS Credits:

3 ECTS

Timing:

Free

Learning outcomes:

Objective: Students learn the basic moral philosophical principles for solving eth-ical problems in IT.

Learning Outcomes:

- 1) Students learn the key concepts of computer ethics;
- 2) Students do not only understand, but they can also apply the basic princi-ples of theories of ethics to compute ethics dilemmas;
- 3) Students understand the ethical problematic associated with privacy and IPR, including software rights.

Contents:

1. Key concepts, 2. Introduction and short history of computer ethics, 3. Classical theories of philosophical ethics (Hume's law, intuitionism, egoism, emotivism, relativism, Kant's categorical imperative, Rawls' veil of ignorance as a part of theory of justice, Hare's Universal Prescriptivism, Information Ethics, Virtue Ethics), 4. Privacy, 5. IPR in general and software rights in particular, 6. hacking and principles of professional ethical codes of conducts and problems thereof.

Learning activities and teaching methods:

Lectures 15h, teacher led (group) discussion

Recommended optional programme components:

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Recommended or required reading:

Notes, text book Johnson, D. G., (1994; 2001), Computer Ethics, Prentice Hall. Upper Saddle River sekä osia teoksesta: Weckert, J., & Adeney, D., (1997), Computer and Information Ethics.Greenwood Press. Westport, Connecticut, London.

Assessment methods and criteria:

Examination

Grading:

1-5

Person responsible:

Mikko Siponen

813319A: Creation of business opportunities in software business, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Tiikkaja, Marjo Kristiina

Opintokohteen kielet: Finnish

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

Opettajat: Martti Luodonpää

Opintokohteen kielet: Finnish

Leikkaavuudet:

521144A Algorithms and Data Structures 6.0 op

Ei opintojaksokuvauksia.

815340A: Data security in wireless communication, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Ari Vesanen

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS

Timing:

free

Learning outcomes:

Objective: The course covers the protocols of wireless communication with emphasis on security. Also security of the most common communication methods (wireless local and personal area networks, and wireless telephone networks) is covered at protocol level.

Learning Outcomes: Knowing the characteristic security features of wireless communication. Knowing the principal security features of the most common wireless communication protocols.

Ability to compare the security of different wireless local area network protocols. Ability to compare the security of different wireless telephone networks.

Contents:

Introduction, Threats and risks of wireless communication, Wireless local network security, Wireless personal area network security, Wireless telephone network security, WAP security.

Learning activities and teaching methods:

Lectures 40h.

Recommended optional programme components:

Principles of Information Security and Networks security.

Recommended or required reading:

Nichols-Lekkas: Wireless Security, Models, Threats, and Solutions, McGraw -Hill 2002. Maxim, Merrit: Wireless Security, Blacklick, OH, USA: McGraw-Hill Professional, 2002.

Assessment methods and criteria:

Exam

Grading:

1-5

Person responsible:

Ari Vesanen

811384A: Database systems, 4 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Leikkaavuudet:

812612S Database management systems 6.0 op

812612S-02	Database management systems, partial credit	0.0 op
812612S-01	Database management systems, partial credit	0.0 op

ECTS Credits:

6 ECTS

Timing:

4rd year, period 4

Learning outcomes:

Objective: The course introduces indexes, transactions, concurrency management and recovery techniques. The course introduces also distributed, object-oriented and XML databases, data warehouses, data mining and semantic web.

Learning Outcomes: After finishing the course the student understands the role of indexes as a method for improving efficiency of the database queries, and principles of transactions, concurrency management and recovery techniques. The student can perform queries to object-oriented and XML databases. The student knows data warehousing techniques and architectures and knowledge discovery phases. The student knows data mining methods and their applicability to different problems. The student understands the potential of semantic web in knowledge presentation.

Contents:

Indexing, queries, concurrency management and recovery, object-oriented databases, XML databases, security of databases, data warehouses, data mining, semantic web

Learning activities and teaching methods:

Lectures, study group working, essay, exercises, assignment

Target group:

4rd year

Recommended optional programme components:

Basics of databases, Object oriented analysis and design

Recommended or required reading:

Silberschatz, Korth & Sudarshan: Database system concepts, 6th edition, McGraw-Hill, 2010, chapters: 14-21, 24-26

lecture material <http://www.tol.oulu.fi/users/burak.turhan/>

Assessment methods and criteria:

Exam and assignment.

Grading:

1-5

Person responsible:

Ilkka Tervonen

813318A: Dimensions of software entrepreneurship, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Jukka Kontula

Opintokohteen kielet: Finnish

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

Ei opintojaksokuvauksia.

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

Ei opintojaksokuvauksia.

813353A: Electronic Commerce, 4 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

4 ECTS

Timing:

4th year, period

Learning outcomes:

Objective: In this interdisciplinary study module, the information systems which support the companies' business and trade are studied. (Look at the Learning Outcomes below).

Learning Outcomes: After the course, a student has an understanding of the properties of the good trading centre, a business strategy, productivity, the user experience and the significance of confidence and information security. S/he also understands the difference between the physical and virtual trade as elements which supplement each other.

Contents:

Theory, case studies, and videos connected to the textbook and to the publications, 2-3 lecturer guests.

Learning activities and teaching methods:

During school year 2009-2010, the course realization is arranged as a book examination and by participating (15h) or book examination and essay.

Target group:

4th year

Recommended optional programme components:

As compulsory preceding studies: Introduction to Information Systems Analysis and Design. The course is compulsory for 2nd year students in the Digital Medium and Information Systems specialisation programmes.

Recommended or required reading:

Textbook: Turban et al. (2008), lectures + 5 literature articles

Assessment methods and criteria:

During school year 2009-2010, the course realization is arranged as a book examination and by participating (15h) or book examination and essay.

Grading:

On the basis of examination

Person responsible:

Kaisu Juntunen

813616S: Globalized software company, 6 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Juhani Warsta

Opintokohteen kielet: Finnish

ECTS Credits:

6 ECTS

Timing:

4th year, period 2

Learning outcomes:

Objective: After the course students understand and are able to analyze international software business

Learning Outcomes: Students master the search of additional information, are able to summarize scientific articles and present it verbally

Contents:

Part 1: Software companies' internalization strategies and theories

Part 2: Operation forms related internalization and choosing distributional channels

Part 3: Formation and controlling partner networks

Part 4: Legal aspects relating to the internationalization process and effects of internationalization in the software development

Part 5: Visiting lecturers

Changing lectures given by visiting lecturers

Learning activities and teaching methods:

Lectures 27 h, article summary, verbal presentation of the article summary, lecture exercises and examination

Target group:

4th year

Recommended optional programme components:

-

Recommended or required reading:

1. Luostarinen and Welch (1993) International business operations, Helsinki School of Economics

2. McHugh (1999) Making it BIG in Software

Assessment methods and criteria:

Examination

Grading:

Fail, 1 - 5

Person responsible:

Juhani Warsta

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: lisakka, Juha Veikko

Opintokohteen kielet: Finnish

Leikkaavuudet:

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

ECTS Credits:

3 ECTS

Timing:

1st year, period 2

Learning outcomes:

Objective: A student has an idea what is a human being like as a computer user in order to understand better next courses - especially usability courses.

Learning Outcomes: After finishing the course the student understands how a human being behaves with a computer contrast with human beings without any computers

Contents:

A human being as a social and psychological being and as a computer user. Acceptance of innovations

Learning activities and teaching methods:

Lectures (in Finnish).

Target group:

1st year

Recommended optional programme components:

-

Recommended or required reading:

Will be informed in the course

Assessment methods and criteria:

Exam, Non-Finnish can take the course only in rare exceptional cases

Grading:

1-5

Person responsible:

Juha Iisakka

815348A: ICT Standardization, 6 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

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: Ari Heiskanen

Opintokohteen kielet: English

Ei opintojaksokuvauksia.

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

Timing:

Free, 3rd -n year or Master of Science students.

Learning outcomes:

Objective: Recognizing, sharing and development of collective capabilities within information processing studies and tutoring.

Learning Outcomes: Student recognizes and puts to the test some proficiency in areas of information processing and aims to develop it in co-ordination with others.

Contents:

Recognizing the know-how area for tutoring, plan of action, organizing, observing, reflection of own learning outcome and reporting.

Learning activities and teaching methods:

Kick off, info or guidance sessions, plan of action, organizing and documenting tutoring, intermediate/end reporting and feedback session.

Target group:

3rd -n year or Master of Science students.

Recommended optional programme components:

Good knowledge on course areas selected for tutoring activity.

Recommended or required reading:

Ackerman et al. (2003) Sharing expertise; Clemmensen, T. (2005) Community knowledge in an emerging online professional community, Knowledge and Process Management 12(1) 43-52; Orlikowski, W. (2002) Knowing in practice: Enacting a collective capability in distributed organizing. Organization Science 13(3): 249-273; <http://tutkimus.parvi.fi/index.php/Lähteitä> and course materials of Information Processing Science.

Assessment methods and criteria:

Tutoring plan, intermediate and end reports.

Grading:

Pass / fail.

Person responsible:

Anna-Liisa Syrjänen

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

Ei opintojaksokuvauksia.

Compulsory

811168P-01: Information Security, exercise work, 0 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Basic Studies

Laji: Partial credit

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

811168P-02: Information Security, exam, 0 op**Voimassaolo:** 01.08.2010 -**Opiskelumuoto:** Basic Studies**Laji:** Partial credit**Vastuuyksikkö:** Department of Information Processing Science**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Juha Kortelainen**Opintokohteen kielet:** Finnish

Ei opintojaksokuvauksia.

030005P: Information Skills, 1 op**Opiskelumuoto:** Basic Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Technology**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Koivuniemi, Mirja-Liisa, Sassali, Jani Henrik**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

030004P Introduction to Information Retrieval 0.0 op

ECTS Credits:

1 credit.

Language of instruction:

Finnish/English

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.

Learning activities and teaching methods:

The course involves training sessions (8h), web-based learning materials, exercises in the Optima learning environment and a final assignment on a topic of the student's own choice.

Recommended or required reading:

Web-based learning material from Toolbox of Reseach (<https://wiki oulu.fi/display/tor/1.1+Finding+scientific+information>)

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

Other information:<http://www.kirjasto oulu.fi/index.php?id=738>**812644S: Information System Applications, 5 op****Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Valeriy Naumov

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS

Timing:

Timing and target group: Period b (tentatively), 4th to 5th years. The course is recommended for students in the Information Systems study line.

Learning outcomes:

Objective: The course introduces a selected application area or an application type through scientific literature and available software applications. The application areas and/or types may vary yearly.

Learning Outcomes: After completing the course the student: (a) has a view on the selected application domain and/or application type, in particular from the consumer and organization viewpoints, (b) is able to analyse the critical success factors for information system applications for the focus area/type, and (c) is able to understand the challenges in the application design and development in focus area/type. Examples of application areas are health care information systems, different business applications such as banking insurance, and governmental information systems. Potential application types are electronic commerce, business intelligence and customer relationship management systems.

Learning activities and teaching methods:

Lectures, seminar presentation, and examination.

Recommended optional programme components:

Organisations and Information Systems and Information Systems Design Methods are recommended as preceding courses.

Recommended or required reading:

Lecture materials.

Assessment methods and criteria:

Exam

Grading:

1-5

Person responsible:

Katja Leiviskä

812304A: Information Systems in Organizations, 6 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

6 ECTS

Timing:

2nd year, period 4.

Learning outcomes:

Objective: The course gives a broad overview of information systems in contemporary organizations.

Learning Outcomes: After completing the course the student knows the meaning of information systems for organizations, understands what are the prerequisites for successful information systems activity and knows the main lines of information systems development in organizational context.

Contents:

Fundamentals of organizations, structure and functioning, digital organization, basic types of information systems, the role of information systems in organizations, the interplay between information systems and organizations, the role on information systems in organizational leadership and decision making, the formation and mastering of organizational information, enterprise resource planning systems, the renewal of organizations with information systems, the economic aspects of information systems.

Learning activities and teaching methods:

Lectures (27 hours), self-governing reading of course material.

Recommended optional programme components:

Basics of information systems planning

Recommended or required reading:

Laudon, K.C and Laudon, J.P., Management Information Systems, Prentice-Hall, Upper Saddle River, NJ, Sixth edition, 2000, pp. 2 - 159, 330 - 367, 398 - 495 or Seventh edition, 2002, pp. 2 -101, 301 - 429, or Ninth edition 2006, pp. 1 - 111, 378 - 506, 534 - 569, or Tenth edition, pp. 3 - 119, 428 - 523, 552 - 587.

Handy, C., Understanding Organizations, Penguin Books, Fourth 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:

Exam

Grading:

1-5

Person responsible:

Ari Heiskanen

811327A: Information security management, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Kuivalainen, Tapio Ilmari

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS

Timing:

Free

Learning outcomes:

Objective: Students understand the principles for information security management at organizations

Learning Outcomes:

- How to develop BCP
- How to develop organization specific information security policies and sub-policy systems at organizations
- How to measure employees' compliance with these information security policies
- How to improve employees' compliance with the information security procedures through training, campaigning and other measures
- How to carry out risk management in practice
- How to estimate the economical investments of Information security
- Understand the strengths and weaknesses of information security management standards
- Understand the certifications in the area of information security management
- How to design organizational controls

Contents:

1. BCP, 2. development of organization specific information security policies and sub-policy systems at organizations, 3. measuring employees' compliance with information security policies, 4. improving employees' compliance with the information security procedures through training, campaigning and other means, 5. risk mgt., estimation of economical investment of information security; information security management standards, 6. Certifications, 7. Designing of information security controls at organizations

Learning activities and teaching methods:

lectures 32h and exercises 15h

Recommended optional programme components:

introduction to information security

Recommended or required reading:

articles (to be announced later)

Assessment methods and criteria:

examination

Grading:

scale of 1 to 5

Person responsible:

to be defined later

812334A: Information systems planning, 6 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Ari Heiskanen

Opintokohteen kielet: Finnish

ECTS Credits:

6 ECTS

Timing:

3rd year, periods 2+3

Learning outcomes:

Objective: The course deepens the know-how gained in the course Basics of Information systems planning. The emphasis is on how to develop an information systems from the point of view of the user work and organizational functions.

Learning Outcomes: Having completed the course, the student understands the connections between information systems design and redesign of users' and customer organizations' work practices, knows how to apply an information systems design methodology in practice, and possesses the basic skills to study information systems design methodologies in more depth in the Information Systems Design Methodologies course.

Contents:

A practical information systems design exercise is carried out in groups of 3 to 4 students. The focus is on phases of information systems design before software design. The exercise work is carried out using a chosen information systems design methodology (currently Contextual Design).

Learning activities and teaching methods:

Lectures (24 h), exercises (24 h), course assignment (90 h), seminars (12 h), individual learning diary (10 h).

Target group:

3rd year

Recommended optional programme components:

Basics of information systems planning, object oriented analysis and design.

Recommended or required reading:

Beyer, H. Holtzblatt, K. (1998): Contextual Design: Defining Customer-Centered 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 fulfillment of the assignment. The results of the assignment are presented in seminars, with comments from opponents. With a good ground, the course can be passed via an individual work.

Grading:

1-5

Person responsible:

Ari Heiskanen

813601S: Information systems theory, 10 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

10 ECTS

Timing:

5th year, periods 2+3+4

Learning outcomes:

Objective: The purpose of the course is to introduce to Information Systems as a scientific discipline, its major research areas and to integrate the master level courses in Information Systems.

Learning Outcomes: By complementing this course, student understand the nature of Information Systems as a scientific discipline, especially its role among the disciplines of computing and its relationships with reference disciplines. Understands major research areas of Information Systems and especially those concerning information systems development and use. Is able to read scientific articles published in leading publication outlets of Information Systems. Is able to write "scientific" texts and to present them

Contents:

1. Introduction to Information Systems
2. Research into the organizational context of information systems
3. Research into information content and language context of information systems
4. Research into information systems development and change processes
5. Research into information systems use
6. Research into information systems quality
7. Special research issues in Information Systems

Learning activities and teaching methods:

Lectures (15 x 3 h), article reviews (10), essay on a specific topic related to information systems and its oral presentation

Target group:

5th year

Recommended or required reading:

To be announced during the course implementation

Assessment methods and criteria:

By active participation (min 80 % participation) or exam

Grading:

Exam: 1-5, active participation:

- essay (50 %)
- article reviews (50 %)

Person responsible:

Juhani Iivari

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:** Anna-Liisa Syrjänen**Opintokohteen kielet:** English**ECTS Credits:**

6 ECTS

Timing:

4th year, periods 1+2

Learning outcomes:

Objective: To apply interaction design from the viewpoint of user experience.

Learning Outcomes: Student is familiar with focal interaction design terms, design and evaluation methods and has some practical experience in their applying.

Contents:

Terms, characteristics and goals of interaction design; interaction, user experience and its relationship to usability; the problem space and conceptualizing the design space; interaction types; collaboration and communication;

affec-tive aspects; design data, gathering and analysis; user needs and requirements; design process and activities; evaluation approaches and methods.

Learning activities and teaching methods:

Info session or lecture, reading up on course materials and assignment, course book exam or essay.

Target group:

4 th year

Recommended optional programme components:

Introduction to human-computer interaction (811379A, 5 ECTS)

Recommended or required reading:

Sharp et al. (2007, 2. edition) Interaction Design and other related course books and materials.

Assessment methods and criteria:

A course book exam or an essay and an assignment on interaction design and evaluation with interactive products or information systems.

Grading:

1-5

Person responsible:

Anna-Liisa Syrjänen

817601S: International ICT Business, 5 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Olli Martikainen

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

811338A: Internet and Computer Networks, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS

Timing:

1st year, period 3

Learning outcomes:

Objective: To present the general functioning principles of a modern packet switching computer networks, to get to know (also in a computer class) the characteristics of different network protocols, to get acquainted with the principles of both connectionless and connection-oriented data transmission, addressing and routing in Internet as well as with security in computer network environment.

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 those general principles along which routing in IP-networks is carried out. She/he is capable 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 analyzing 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 reference models 3. The functioning of the application layer, network application architectures, communicating processes, transport services 4. Classical network applications: electronic mail, file transfer, remote login, newsgroups 5. New applications in Internet: DNS, World Wide Web and HTTP, content distribution 6. Data transmission in Internet. UDP protocol: connectionless and simple. TCP protocol: connection-oriented and reliable data transfer 7. Addressing and routing in Inter-net, 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 devices, wireless connections 10. The principles of network security, security in different layers of the network

Learning activities and teaching methods:

lectures 40 h, exercises 30 h, autonomous work about 60 h

Target group:

1st year

Recommended optional programme components:

preceding course Discrete Structures

Recommended or required reading:

lecture slides (about 250 slides), lecture notes (about 100 pages), text book: J. F. Kurose and K. W. Ross, Computer Networking. A Top-Down Approach, Fifth Edition, Pearson Education Inc., 2010. ISBN: 978-0-136548-3.

Assessment methods and criteria:

passing by either partial exams (3 exams) or by a final exam

Grading:

on the scale 1 - 5

Person responsible:

Juha Kortelainen

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: Petri Pulli

Opintokohteen kielet: Finnish

Leikkaavuudet:

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

ECTS Credits:

4 ECTS

Timing:

1st year, autumn semester, periods 1-2.

Learning outcomes:

Objective: Introduce the history, concepts and vocabulary of Information and Communication Technologies (ICT). Introduce teaching areas and research top-ics of information processing sciences. Introduce to scientific writing an small scale essay based on chosen topic on given source material.

Learning Outcomes: After completion of the course, the student is able to understand ICT role in information society, productivity increase and regional development, standard of living and quality of life. Student is familiar with the focus teaching areas and contemporary research topics of the information processing science. Student is able to author small scale scientific essay on given subject material.

Contents:

1. Historical development and present state of ICT
2. Information processing science vocabulary and concepts
3. Software development and production
4. Data management and database management systems
5. Information security
6. Information systems and web services
7. Mobile services

- 8. Software business
- 9. User interfaces
- 10. Currently active research

Learning activities and teaching methods:

Lecture slide handouts (In Finnish) and lecture video recordings (in Finnish) will be supplied via course web page and can be downloaded along the course progresses. A printed collection of lecture handouts will become available after the course completed before exam.

For foreign English speaking students the book for exam and materials for essee writing are negotiated individually.

Target group:

1st year

Recommended optional programme components:

Course assumes no prior university level courses.

For foreign English speaking students it is required that the students are accepted as exchange students in the Department of Information Processing Science.

Recommended or required reading:

Lecture slide handouts (In Finnish) and lecture video recordings (in Finnish) will be supplied via course web page and can be downloaded along the course progresses. A printed collection of lecture handouts will become available after the course completed before exam.

Assessment methods and criteria:

Grading is based on student activity in course participation and timeliness of deliverables, knowledge shown in written exam and quality of written essay.

Grading:

Grading is based on student activity, exam and essay. Grading scale is 1-5.

Person responsible:

Petri Pulli

811170P: Introduction to Information Systems Analysis and Design, 6 op

Voimassaolo: - 31.07.2010

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Iivari, Pekka Toivo Juhani

Opintokohteen kielet: Finnish

Leikkaavuudet:

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

811329A Introduction to information systems design 5.5 op

811329A-02 Introduction to information systems design, exam 0.0 op

ECTS Credits:

5 ECTS

Timing:

1st year, period 3

Learning outcomes:

Objective: The purpose of the course is to provide a holistic view of information systems development. Students who have passed the course should have preliminary skills to model the organizational context as well as the information content and functionality of an information system. Furthermore, the students should know the major areas of the technical design, major process models of information systems development, basics of requirements construction, basics of information systems implementation, and basics of information systems evaluation.

Learning Outcomes: Can apply workflow models, context diagrams and use cases to modeling the organizational context of an information system

Can 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

Knows the major areas of technical design of an information system, major process models of information systems development, basics of requirements construction, basics of information systems implementation, and basics of information systems evaluation

Contents:

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

Learning activities and teaching methods:

Lectures (10 x 3 h), exercises (7 x 3 h), where students do an mandatory group work.

Target group:

1st year

Recommended optional programme components:

Introduction to information processing sciences,
Human as users and developers and of information technology

Recommended or required reading:

Primarily based on:

1. Satzinger, Jackson ja Burd (2007), Systems Analysis and Design in a Chang-ing World (chapters ???)
2. Hoffer, George and Valacich (2008?), Modern systems Analysis and Design, 5. edition (chapters ???)

Assessment methods and criteria:

Exam + mandatory exercise work

Grading:

Exam: 1-5, exercise work: Passed

Person responsible:

Juhani Iivari

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: Kaisu Juntunen

Opintokohteen kielet: Finnish

Leikkaavuudet:

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

Ei opintojaksokuvauksia.

811122P: Introduction to Programming, 5 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Ilkka Räsänen

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay811122P Introduction to Programming (OPEN UNI) 5.0 op

ECTS Credits:

5 ECTS

Timing:

1st year, periods 1+2

Learning outcomes:

Objective: Student can systematically design, accomplish and test simple pro-grams using C-language as a target language.

Learning outcomes: After the course student

- understands the importance of design in programming
- can design and implement modular programs
- understands the principles of control structures and can exploit them
- understands the meaning on array construction and can exploit them
- understands the meaning of pointers and can exploit them
- understands the meaning of data structures and can exploit them
- can manipulate txt files programmatically

Contents:

- software design method, (waterfall)
- problem solving,
- stepwise refinement
- control structures
- modular programming, calling modules, communication between modules
- datatypes
- arrays
- pointers
- character strings
- data structures
- file processing

Learning activities and teaching methods:

lectures and exercises

Target group:

1st year, periods 1+2

Recommended optional programme components:

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Recommended or required reading:

<http://www.tol.oulu.fi/users/ilkka.rasanen/johdanto.html>

Course book: Datel, Datel: C HOW TO PROGRAM; Pearson Education Inc. 2007

Assessment methods and criteria:

two ways:

1. final exam + exercise points
2. weekly exams + exercise points

Grading:

1-5

Person responsible:

Ilkka Räsänen

811174P: Introduction to Software Business, 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:**

811178P Technology Business and Innovations 5.0 op

ay811174P Introduction to Software Business (OPEN UNI) 5.0 op

ECTS Credits:

5 ECTS

Timing:

1st year, period 4

Learning outcomes:

Objective: After the course students understand and are able to analyze soft-ware business from the following three viewpoints:

1. Software industry
2. Business logic
3. Software company

Learning Outcomes: Students master the search of additional information and are able to write essays

Contents:

Part 1: Industry analysis

The structure of software industry and clusters
Software business in the other industries
Technology management and strategy

Part 2: Business logic

The business models of software industry
Open source code
Productization of software
Networking and outsourcing

Part 3: Operations of Software Company

Growth and development of software company
Life cycle of software business
Strategic and organizational management
Internationalization

Marketing and selling software

Part 4: General

History of software business
Research in software industry and business
IT law

Part 5: Visiting lecturers

Changing lectures given by visiting lecturers

Learning activities and teaching methods:

Lectures 30 h, essay, lecture exercises and examination

Target group:

1st year

Recommended optional programme components:

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Recommended or required reading:

1. Messerschmitt, D.G. & Szyperski C. 2003. Software Ecosystem. Cam-bridge, MA: The MIT Press
2. Other literary material: journal articles, book chapters etc.

Assessment methods and criteria:

Examination

Grading:

Fail, 1 - 5

Person responsible:

Juhani Warsta

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: Kuutti, Kari Pekka Tapani

Opintokohteen kielet: Finnish

ECTS Credits:

3 ECTS

Timing:

3rd year, periods 1+2

Learning outcomes:

Objective: The course has two objectives: first is to give an overall view on the role of research in society and in university, and to give an idea what research work is in practice and within different time scales and scopes from a humble master thesis project to long-term, multipartner projects and beyond. The second objective is to prepare a student for the work with the candidate thesis, and give some practical skills for that.

Learning Outcomes: Student knows the role of research in society and where the research done within the department is located within the field of research. Student knows the basic parts of a research process, and their connection together, and the role of their intermediate products in that. Student understand the role of scientific publishing for research, both with respect to the access of earlier research and for dissemination of the results of a research activity. Student can identify different publication channels and can evaluate the quality of a publication at least using two criteria: the quality of a channel and the number of citations. Student understands the role of scientific argumentation for research, knows the major parts of an argument and can analyse simple argument structures. Student understand the role of empirical material for research, knows the main methods for data collection and analysis and about their differences. Student can do searches using digital libraries.

Contents:

General information about research, scientific publishing, scientific argumentation, methods for empirical data collection and analysis, information searching using scientific databases.

Learning activities and teaching methods:

Lectures, exercises

Target group:

3rd year

Recommended optional programme components:

Preparation for candidate thesis

Recommended or required reading:

Lecture notes, exercise notes, scientific publications

Assessment methods and criteria:

Participation to lectures and exercises, evaluation of submitted results

Grading:

1-5

Person responsible:

Kari Kuutti

812641S: Location and Context Based Services, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Jouni Markkula

Opintokohteen kielet: English

ECTS Credits:

5 ECTS

Timing:

4th year, period 2

Learning outcomes:

Objective: The course aims at demonstrating how location and context-aware mobile services work and how they are built.

Learning Outcomes: After the course the student will understand what technologies and architectures can be used to build location and context awareness in software applications. The student will understand the potential and challenges presented by mobile platforms and smart environments. Furthermore, the student will remember a variety of services that utilize context-awareness and understands how they work.

Contents:

1. Geographic information systems
2. Context-aware computing

3. Pervasiveness and mobility
4. Technological considerations
5. Ethical and commercial issues
6. Applications

Learning activities and teaching methods:

Lectures, demonstrations.

Target group:

4th year

Recommended optional programme components:

: Internet and Computer Networks, Mobile Internet Service Architecture.

Recommended or required reading:

Material listed in the course web page.

Assessment methods and criteria:

Seminar assignment.

Grading:

1-5

811387A: Mac OS X Programming, 4 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

4 ECTS

Timing:

4th year, periods x

Learning outcomes:

Objective: The course aims at familiarizing the student with the Mac OS X as a programming environment.

Learning Outcomes: After the course the student will understand the principles and essential frameworks and libraries of the Cocoa application interface. The student will also be able to use programming tools provided by Apple and re-members the basics of the Objective C language. Furthermore, the student understands the structure of iPhone applications and the principles of iPhone application development. The student can also apply the Model-View-Controller model in the programming work.

Contents:

1. Objective-C
2. Cocoa
3. XCode
4. Cocoa Touch
5. iPhone SDK

Learning activities and teaching methods:

Lectures, laboratory exercises, assignment.

Target group:

4th year

Recommended optional programme components:

Object-oriented Analysis and Design

Recommended or required reading:

<http://developer.apple.com> and other material provided during the course.

Assessment methods and criteria:

Programming assignment.

Grading:

Fail/approved

Person responsible:

Lasse Harjumaa

813620S: Managing Software Business, 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:

6 ECTS

Timing:

4th year, period 1

Learning outcomes:

After the course a student

is able to tell what are 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 company situation in a continually changing, unpredictable and even hostile environment, and is able to make well-grounded recommendations for the company course of actions.

Contents:

Software business environment and context is typically complex and under continuous change. Competences and creativity of the company employees are needed for creating value and growth to the company. Managing software business is a challenging task as traditional, rational management models are often inadequate for the needs of the managers. This course provides an overview of management of software business in a software company.

Learning activities and teaching methods:

Lectures 32 h, a take home exam 30 h, a group work 30 h, independent work 68 h.

Target group:

4th year

Recommended optional programme components:

Recommended courses to complete previously: Introduction to software business, Software business planning, Creation of business opportunities in software business, and Dimensions of software entrepreneurship.

Recommended or required reading:

Will be told in the beginning of the course.

Assessment methods and criteria:

A take home exam and a group work.

Grading:

Grade for the course is based on the results of both the take home exam and the group work.

Person responsible:

Marianne Kinnula (marianne.kinnula@oulu.fi)

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: Saukkonen, Samuli

Opintokohteen kielet: Finnish

ECTS Credits:

2 ECTS

Timing:

4th - 5th year, period 1,2,3 and 4

Learning outcomes:

Objectives: The course integrates the whole curriculum. From the student viewpoint the course supports the planning, execution and evaluation of own graduate thesis work.

Learning Outcomes: By complementing this course the student can plan a scientific study and understands the approach the reviewers are evaluating a study report.

Contents:

See passing the course.

Learning activities and teaching methods:

Planning and presenting student's own research. Listening to peer students' research plans and research reports.

Target group:

4th - 5th year

Recommended optional programme components:

Master's thesis course.

Recommended or required reading:

Guidelines of making a master's thesis.

Assessment methods and criteria:

Active participation to at least seven seminar sessions. One session lasts about 3 hours and they are arranged during the semesters by the plan to be published on the web pages. The students will present their own research plan and the research close to its completion before official evaluation. During the presentation the research will be discussed critically by an opponent.

Grading:

pass/no pass

Person responsible:

Samuli Saukkonen and Johanna Nuojua

815639S: Methods for Designing Secure Information Systems, 6 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Mikko Siponen

Opintokohteen kielet: Finnish

ECTS Credits:

6 ECTS

Timing:

4th year, period 1

Learning outcomes:

Objective: Students understand the principles for development of secure information systems and software.

Students understand the different methods for the development of secure information systems and software, and the strength and weaknesses of these methods. The students also get hands on experience in integrating security into IS and software development methods.

Learning Outcomes:

- awareness of on the different methods for the designing secure systems and software;
- awareness of the strengths and limitations of these methods
- how these methods can be integrated 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, 3. strength and weaknesses of these methods, 4. Application of selected methods for the designing of systems and software by integrating them to the system development process.

Learning activities and teaching methods:

Lectures 36 h and exercises 12h

Target group:

4th year

Recommended optional programme components:

Introduction to information security, introduction to information systems design, object oriented analysis and design or software engineering

Recommended or required reading:

Articles (to be announced later)

Assessment methods and criteria:

Examination

Grading:

1-5

Person responsible:

will be defined later

815349A: Mobile Internet Service Architecture, 7 op**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Department of Information Processing Science**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** English**ECTS Credits:**

6 ECTS

Timing:

4th year, periods 1+2

Learning outcomes:

Objective: The course is an introduction to the general architecture of mobile In-ternet and its core enablers and services. MISA course delivers a comprehensive knowledge base for mobile service understanding, creation and management.

Learning Outcomes: After completion of the course, the student understands architectural framework of Internet and mobile network service provision layers, interfaces and service primitives. Student is able to extend/modify existing mobile services as well as design and implement simple mobile services based on available primitives and bearer service capabilities.

Contents:

The topics included are: principles, service software architecture, service enablers, All-IP vision, IPv6, mobile IP, Quality of Service, SIP, mobile VPN, wireless access, application layer technologies, service development tools, commercial and open-source platforms. Lectures review also the current and emerging technologies and their deployment. The exercises demonstrate exam-ples of different maturity technologies and their implementations.

Learning activities and teaching methods:

: lectures (36 h) exercise (90 h) exam (30). Part of the lectures is online digital presentations. Exercises include 10 hours laboratory demonstrations and 50 hours student project. Laboratories are compulsory 3 out of 5, and they are scheduled with 2 hours / lab and 1 lab / week. The student project groups are organized into teams of students (2-3 students per team). For student project reporting recommended language is English but Finnish can be used as well.

Target group:

4th year

Recommended or required reading:

Nokia: Mobile Internet Technical Architecture Vol 1-3, IT Press. ISBN 951-826-671-9. (partially). Camarillo, Gonzalo, and Miguel-Angel Garcia-Martin: The 3G IP multimedia subsystem (IMS): merging the Internet and the cellular worlds. John Wiley & Sons, 2004. ISBN 0-470-87156-3. 406 p. (partially). Lecture notes.

Assessment methods and criteria:

1) Compulsory attendance for exercise classes (3 out of 5), 2) Completion of the assigned project work (80 hours), 3) Passing the exam.

Grading:

1-5

Person responsible:

Petri Pulli

815645S: Mobile Research, 10 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Olli Martikainen

Opintokohteen kielet: Finnish

ECTS Credits:

10 ECTS

Timing:

4th- 5th year, periods 2+3+4

Learning outcomes:

Objective: Basic knowledge on scientific research, reading and writing scientific articles and application of some basic theories.

Learning Outcomes: The student is able to read scientific articles, standards and patents, write scientific articles and reports, make presentations on them and apply some basic theories in economics and innovation research.

Contents:

History of Finnish ICT cluster, case Nokia and Sonera. The concepts of industry, value chain, product, service, IPR, patent, alliance, innovation, technology cycle, technological system, dominant design, complementarity, competence block and generic competitive strategies. Reading and writing scientific articles, application of qualitative and quantitative research methods and basic theories in them.

Learning activities and teaching methods:

Lectures, presentation on chosen article, writing an own article and its presentation.

Target group:

4th- 5th year

Recommended optional programme components:

815349A Mobile Internet Service Architecture

Recommended or required reading:

Lectures and chosen scientific articles.

Assessment methods and criteria:

Presence in lectures, two seminar presentations and the written article. Also possible to take examination and write article.

Grading:

Seminar presentations and article.

Person responsible:

Olli Martikainen

811359A: Mobile Systems Programming, 6 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

815308A Embedded Software Development Environments 4.0 op

Ei opintojaksokuvauksia.

812337A: Net Culture, 4 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Eeva Leinonen

Opintokohteen kielet: Finnish

811354A: Networks Security, 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

Timing:

4th - 5th year, period x

Learning outcomes:

Objective: To present theoretical and practical solutions for security problems in computer networks. To make oneself familiar with cryptography and authentication as well as the most important practical security tools (Kerberos, IPSec, TLS) and solutions (certificate- and PKI-standards). To get to know application level security (electronic mail, web), firewalls and Intrusion Prevention Systems.

Learning Outcomes: The student remembers the special features of network security, the central security services and mechanisms intended to guarantee the services. She/he is able to explain the principles on which the design of block ciphers and iterative hash functions is based and describe on general level the operations of the most important encryption and hash algorithms as well as to apply the theory learned in small-scale practical exercises. The student is capable to explain the architecture of Kerberos authentication service and the message exchange happening in it as well as to illustrate the security of the service. She/he can list the different components of a Public Key Infrastructure and estimate their functions and compare the

- realization of security in different layers of a computer network
- characteristics of security solutions in network layer and transport layer (IPSec) versus SSL/TLS)
- the alternatives of secure electronic mail (S/MIME, PGP)

Furthermore the student identifies the vulnerabilities and threats of web applications and is able to describe the properties and functions of different firewall and IDPS technologies.

Contents:

1. Introduction and background, 2. Cryptography, 3. Authentication 4. Kerberos, 5. PublicKey Infrastructure, 6. Security in network layer: IPSec, 7. Security in transport layer: SSL/TLS, 8. Electronic mail security, 9. Web security, 10. Firewalls and Intrusion Detection Systems

Learning activities and teaching methods:

Lectures 40 h, exercises 30 h, autonomous work about 60 h

Target group:

4th - 5th year

Recommended optional programme components:

Preceding studies Discrete structures, Information security and Data structures and algorithms

Recommended or required reading:

Lecture slides (about 250 slides), lecture notes (about 100 pages), text book: W. Stallings: Cryptography and Network Security. Principles and Practice, 4th edition, Prentice Hall, 2005. ISBN-10: 0131873164.

Assessment methods and criteria:

Passing by either partial exams (3 exams) or by a final exam

Grading:

1-5

Person responsible:

Juha Kortelainen

811356A: New Media, 5 op**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Department of Information Processing Science**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Kuutti, Kari Pekka Tapani**Opintokohteen kielet:** Finnish**813324A: New Product Development in Software Company, 5 op****Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Department of Information Processing Science**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish

Ei opintojaksokuvauksia.

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**Opintokohteen kielet:** Finnish**ECTS Credits:**

6 ECTS

Timing:

1st year, period 4

Learning outcomes:

Objective: The course does principles of object orientedness as well as object oriented analysis and design modelling and modelling techniques.

Learning Outcomes: After finishing the course the student knows object oriented analysis and design modelling; modelling technique as well as design principles. Moreover, the student is able to analyse and design using these techniques.

Contents:

Principles of object orientedness and object oriented programming; Quality criteria of object orientedness; design patterns; Use cases; activity, class, interaction and state machine diagrams; class realisation.

Learning activities and teaching methods:

Lectures (in Finnish), compulsory exercises and assignments (English available).

Recommended optional programme components:

Basic knowledge of programming and information systems analysis and design

Recommended or required reading:

Bennet, McRobb & Farmer: Object-oriented systems analysis and design, Using UML

Assessment methods and criteria:

A way to pass will be informed in course web pages.

Grading:

1-5

Person responsible:
will be defined later

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

Opintokohteen kielet: Finnish

ECTS Credits:

6 ECTS

Timing:

2nd year, periods 1-2.

Learning outcomes:

Objective: The course aims at demonstrating the concepts and benefits of object-orientation, such as improved structure, quality and maintainability of software.

Learning Outcomes: After the course the student will understand the objectives and concepts of object orientation, its practical value and implementation techniques. The student will be able to apply design patterns and understands the interface/implementation differentiation and principles of the object messaging. In addition, the student will be able to apply inheritance, composition and polymorphism, and remember the Model-View-Controller principle.

Contents:

1. Object-orientation
2. C++ language
3. Composition, inheritance and polymorphism
4. Design patterns and Model-View-Controller
5. Generics and object-oriented data structures

Learning activities and teaching methods:

Lectures, laboratory exercises, weekly examination.

Recommended optional programme components:

Introduction to programming, Introduction to programming assignment, Object-oriented analysis and design.

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 examination (preferred) or final exam + programming assignment

Grading:

0-5

Person responsible:

Lasse Harjumaa

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

Timing:

optional, 4th - 5th year and PhD students, limited participation, period 2

Learning outcomes:

Objective: The course introduces Open Source Software (OSS) paradigm and current topics of OSS research. The aim is to study from different viewpoints, for example, what OSS is and what it is not, the history and organization of OSS projects, methods to switch OSS development and usage, as well as licensing models and possible risks. The emphasis is on research work.

Learning Outcomes: After passing the course, a student will be able to define the historical background and the ideology of OSS. The student will be able participate in OSS project, as well as evaluate the impact of the usage of OSS and licenses on software development and exploitation. In addition, the student will be able to view the phenomenon through the essential scientific research.

Contents:

Open Source Software (OSS) is one of the most topical phenomenon in software development. It affects both the way to produce software and the decisions of user organizations. The most popular OSS projects are Linux operating system, OpenOffice suite, Mozilla/Firefox web browser, and Apache web server. OSS can be studied from different viewpoints, such social, legal, economical, software engineering, and data security viewpoints. The course covers a wide range of the scientific viewpoints of OSS paradigm.

Learning activities and teaching methods:

Lectures and seminars 30 h, seminar preparation 30 h, seminar paper abt 55 h

Target group:

4th - 5th year and PhD students, limited participation

Recommended optional programme components:

Compulsory prerequisites are Software Engineering (811335A) and Introduction to Research Work (811382A).

The course gives ability to pass Project II following the OSS principles, or to write Master's thesis on a OSS topic.

Recommended or required reading:

International articles covering the topic

Assessment methods and criteria:

Participation to seminars and seminar paper

Grading:

1-5

Person responsible:

Henrik Hedberg

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:

3 ECTS

Timing:

1st year, period 1

Learning outcomes:

Objective: The purpose of the course is to lower the starting threshold for aca-demic studies in the University of Oulu and to create basis for purposeful study planning thus for successful studies.

Learning Outcomes: After passing the course a student

1. knows the actions and services of the most important units, organizations and societies from the viewpoint of his /her studies,
2. recognizes the characteristics of the university level studies, own curriculum and the discipline of information processing science from the viewpoint of his / her studies,
3. is able to analyze the purpose of his/her studies and forthcoming study path,
4. is able to create and present his/her first own personal study plan (PSP) and
5. knows the city of Oulu and its services, the basis of IT field and the possibilities for student influence.

Contents:

1. Common occasions and lectures, 2. Small group activities, 3. PSP process, 4. Science library Tellus and Oula-database, 5. Exercises for the basic student software.

Learning activities and teaching methods:

Common occasions and lectures 25 h, small group activities 15 h, exercises 4 h, PSP creation and feedback conversation 8 h, independent personal work 20 h.

Target group:

1st year

Recommended optional programme components:

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Recommended or required reading:

Lecture materials, www-pages, study guides, brochures and forms.

Assessment methods and criteria:

Active participations in lectures, common occasions, exercises and small group activities. PSP display for the study counselor.

Grading:

Approved / failed.

Person responsible:

Amanuenses.

815301A: Parallel programming, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Ari Vesanen

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS

Timing:

4th - 5th year, period 2

Learning outcomes:

Objective: The course covers basics of parallel and concurrent programming and the basic control structures of concurrency. Also basics of distributed programming are discussed.

Learning Outcomes: Knowing the basics of parallel and concurrent programming and the basic design patterns relevant to concurrency. Familiarity with the basics of distributed programming.

Ability to construct multi-threaded programs with basic synchronizing structures in Java.

Ability to analyze concurrent programs and to find common programming errors relevant to concurrency.

Contents:

Introduction to concurrency, Basics of concurrency in Java, Mutual exclusion problem, Semaphores, Monitors, Message passing, Distributed programming, Error handling.

Learning activities and teaching methods:

Lectures 36h and exercises 27h.

Target group:

4th - 5th year

Recommended optional programme components:

Introduction to Programming

Recommended or required reading:

Hartley, Stephen J.: Concurrent Programming: The Java Programming Language Oxford University Press 1998. Chapters 3 - 7.

Ben-Ari, M.: Principles of Concurrent and Distributed Programming, Prentice Hall 1990 Chapter 3

Lea, Doug: Concurrent Programming in Java, design Principles and Patterns Second Edition, Addison-Wesley 2000: (1.3 Design Forces, 1.4. Before/After Patterns, 2.2.5 Deadlock, 2.2.6 Resource Ordering, 3.1 Dealing with Failure, 3.3.4. Confinement and Nested Monitors, 4.1 Oneway messages).

Assessment methods and criteria:

Exam.

Grading:

1-5

Person responsible:

Ari Vesanen

813611S: Personal software process, 6 op**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Department of Information Processing Science**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Lappalainen, Jouni Esko Antero**Opintokohteen kielet:** Finnish**ECTS Credits:**

6 ECTS

Timing:

Not arranged for now, if interested, contact the person in charge to discuss options.

Learning outcomes:

Course objectives: Do you know how able professional of the software industry you are, and how can you systematically develop your skills? Or do you know how to develop a bug-free software product with minimal costs? If the answer is at this point "no" and you are looking for challenges, the Personal software process - course is a demanding and practically oriented course just for you. The course introduces you to the concepts of improving your own software development process and runs you through the fundamental methods of operation in process-oriented software development and process improvement from the viewpoint of an individual software engineer.

Learning outcomes: After passing this course, the student:

- Can consciously manage his or her own working process
- Can set personal improvement goals
- Can measure and analyze his or her objectives and performance
- Can adapt and modify his or her process in order to accomplish the set objectives.

Contents:

In order to enable the improvement of one's working processes the course requires a weekly programming assignment completion. In addition the course deals with the work profile of a software professional, planning of resources, commitments and work process design & management, with the related quality assurance issues.

Learning activities and teaching methods:

lect. 30h, exercise 50h, programming assignments 60h, independent study 10h.

Recommended optional programme components:

Introduction to programming. (811122P) and Programming assignment III / User interface programming. In practice a very good programming skill is required to successfully pass the course (no time to focus in learning to program during the course). Basic prior knowledge of statistics, project working / project management and organizational SPI is useful for the course, although not necessary.

Recommended or required reading:

Humphrey, W.S: A Discipline for Software Engineering, Addison-Wesley, 1995. Additional material is named / provided during the course.

Assessment methods and criteria:

the student must submit all weekly programming tasks with the related process documentation within the given schedule.

Grading:

1-5 / fail

Person responsible:

Jouni Lappalainen

812642S: Personalisation, profiling and segmentation for mobile, 5 op**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Jouni Markkula

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS

Timing:

4th year, periods 1+2

Learning outcomes:

Objective: The course presents personalization and profiling principles, approaches and practices applied in developing contemporary internet and mobile service and application. The course gives the students an understanding why and how services are personalized for the customers and what kind of methods and data are used for customer profiling by the service providers. The challenges and possibilities of personalization are also addressed from the research point of view.

Learning Outcomes: After completion of the course, the student can describe the principles and approaches of personalization of Internet and mobile services and applications. She or he is aware of the profiling done in Internet and can identify the personal data collection done by the service providers. She or he can also describe and analyse the privacy issues related to the personalized services and profiling. The student is able to identify and analyze the basic profiling approaches and methods, search for more information about specific methods and apply them later on in service and application development. The student is also able to identify and specify relevant further research topics in the field.

Contents:

Principles of service and application personalization, personalization approaches, business aspects of personalization, context-based services, customer relationship management, profiling principles, profiling approaches and methods, customer segmentation, privacy and related legislation, personalization related standards, personal data management in profiling, social computing.

Learning activities and teaching methods:

Lectures, course project and seminar

Target group:

4th year

Recommended optional programme components:

-

Recommended or required reading:

Lecture slides, specified literature and other given material

Assessment methods and criteria:

Lecture diaries, essays or exam & course project report

Grading:

1-5

Person responsible:

Jouni Markkula

811173P: Principles of Information Security, 4 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Juha Kortelainen

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS

Timing:

1st year, period 4

Learning outcomes:

Objective: To present the basic concepts, mechanisms and strategies of modern information security from the point of view of an organisation (and thus from the standpoint of information security management). To instruct to

recognize the security problems of Internet and to understand the dangers connected to surfing and doing business in the web. To supervise to manage the security systems of a personal computer (firewall structures, virus detection, secure e-mail) also in practise.

Learning outcomes: The student remembers the main features of the history of information security and is able to define the essential security concepts. She/he recognizes the different phases of the security systems development, is able to evaluate their contents and describe the fundamental characteristics of planning for security. The student is capable on basic level to analyze main scientific methods of information security (risk management, encryption, authentication, access control, etc.) and 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 she/he 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

Learning activities and teaching methods:

Lectures 40 h, exercises 30 h, autonomous work about 60 h

Target group:

1st year

Recommended optional programme components:

Mastering the material presented in the courses Discrete structures and Internet and computer networks

Recommended or required reading:

Lecture slides (about 250 slides), lecture notes (about 100 pages), text book: 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:

Passing by either partial exams (3 exams) or by a final exam

Grading:

on the scale 1 - 5

Person responsible:

Mikko Siponen, Juha Kortelainen

813606S: Pro gradu thesis, 30 - 35 op

Voimassaolo: - 31.07.2011

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

35 ECTS

Timing:

Timing is free, execution can be allocated on several semesters. Obligatory for masters degree, during 4th - 5th year.

Learning outcomes:

Objectives: This is an integrating course of the curriculum and the specialization programmes. By the master's thesis the student will demonstrate his/her ability on scientific thinking, use of scientific methods, familiarity in the research topic, and skills in scientific communication.

Learning objectives: By completing the thesis the student can A) define a relevant focused problem in the field of information processing science, B) apply a scientific method as a tool in solving the stated research problem, C) synthesize research results and evaluate their validity, as well as D) participate in the evolution of ICT and post graduate studies.

Learning activities and teaching methods:

Conducting and reporting research under supervision of personal advisor.

Target group:

4th - 5th year

Recommended optional programme components:

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.

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

Timing:

free

Learning outcomes:

Objectives: This course is meant only for students having information processing science as minor. It is an integrating course of the minor studies. By the thesis the student will demonstrate his/her ability on scientific thinking, use of scientific methods, familiarity in the research topic, and skills in scientific communication.

Learning Outcomes: By completing the thesis the student can A) define a relevant focused problem in the field of information processing science, B) apply a scientific method as a tool in solving the stated research problem, C) synthesize research results and evaluate their validity, as well as D) participate in the evolution of ICT and post graduate studies.

Learning activities and teaching methods:

Conducting and reporting research under supervision of personal advisor.

Recommended optional programme components:

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.

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

Ei opintojaksokuvauksia.

811175P: Programming Assignment I, 2 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:

2 ECTS

Timing:

1st year, periods 2 + 3

Learning outcomes:

Objective: Student can systematically design, implement and test simple pro-grams using C-language as a target language.

Learning Outcomes: to deepen the understanding of design, implementation and testing in programming

Contents:

- problem analysis
- design
- implementation
- documentation

Learning activities and teaching methods:

Independent working + 2 workshop

Target group:

1st year

Recommended optional programme components:

Introduction to programming

Recommended or required reading:

Introduction to programming lecture material

Assessment methods and criteria:

Accomplish programming assignment

Grading:

1-5

Person responsible:

Ilkka Räsänen

812316A: Programming in C, 4 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Ilkka Räsänen

Opintokohteen kielet: Finnish

ECTS Credits:

4 ECTS

Timing:

4th year, periods 2+3

Learning outcomes:

Objective: Student can systematically design, accomplish and test programs us-ing C-language as a target language.

Learning outcomes: After the course student

- understands the importance of design in programming
- can design and implement modular programs
- understands the principles of control structures and can exploit them
- understands the meaning on array construction and can exploit them
- understands the meaning of pointers and can exploit them
- understands the meaning of data structures and can exploit them
- can manipulate txt files programmatically
- can use precompiler directives
- understands the meaning of macros and can use them
- understands the meaning ob bit manipulations and can use them

Contents:

- software design method, (waterfall)
- problem solving,
- stepwise refinement
- control structures
- modular programming, calling modules, communication between modules
- datatypes
- arrays
- pointers
- character strings
- data structures
- file processing
- precompiler directives
- macros
- bit manipulation operations

Learning activities and teaching methods:

Lectures and exercises

Target group:

4th year

Recommended optional programme components:

Introduction to programming

Recommended or required reading:

<http://www.tol.oulu.fi/users/ilkka.rasanen/johdanto.html>

Course book: Datel, Datel: C HOW TO PROGRAM; Pearson Education Inc. 2007

Assessment methods and criteria:

two ways : final exam + exercise work

Grading:

1-5

Person responsible:

Ilkka Räsänen

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

Ei opintojaksokuvauksia.

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

Timing:

3rd year, periods 2+3+4

Learning outcomes:

Objectives: The course integrates the contents of the previous subject matter courses in the degree programme. The implementation environments are defined by the project-specific task descriptions. These task descriptions include, but are not limited to, generic software-, information system-, digital media-, mobile applications- and game implementations. Task descriptions are received primarily from the local software companies or from the research project teams within the university departments.

Learning outcomes: After passing this 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 word.
- Can apply the experience gained from the design, implementation and test-ing of the delivered solution for future software and/or research projects

Contents:

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

Learning activities and teaching methods:

lect. 2h, practical project work 230h.

Target group:

3rd year

Recommended optional programme components:

Compulsory prerequisites: Introduction to Project Work. Project 2 -participation is available only after an approved completion of this course.

Recommended or required reading:

Material from the previous project courses, in addition a project manual within the course www-space.

Assessment methods and criteria:

the student must work for the completion of the project tasks for the required amount of time.

Grading:

pass / fail

Person responsible:

Jouni Lappalainen

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: Saukkonen, Samuli

Opintokohteen kielet: Finnish

Leikkaavuudet:

812610S Project seminar 4.0 op

ECTS Credits:

14 ECTS

Timing:

4.-5. year, period 1,2,3 tai 3,4,1

Learning outcomes:

Objectives: This course integrates the major advanced special studies of our curriculum. The aim is to demonstrate the student's ability to work in a challenging ICT project. Students will learn to acquire and apply new knowledge in the topic of the project, as well as to analyze and report the created new knowledge to peer student groups. Also, the students will demonstrate their skills to conduct a project in a professional way.

Learning Outcomes: By completing this course a student can act as an independent professional member of a project. The skills learnt are composed into two parts: expertise in project's topic and professionalism in project work.

As an expert in the topic area the student

- can search research articles and other up to date information on the topic at hand
 - can apply this information 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 peer students both by a written report and orally.
- As a professional in conducting a project in managed way the student:
- can plan the project
 - can manage the progress of the project with steering group/project team organization (reporting the progress and results of the project, use of steering group in decision making and problem resolution)
 - can follow the progress of the project in real time within the project team

Contents:

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

Learning activities and teaching methods:

Project work 300 hours and seminar ca. 70 hours per student. Attendance to the presentation sessions (1-2 days) is mandatory. International exchange students have an option to participate only in the project part of the course (300 hours). In this case the ECTS credits will be 11.

Target group:

4th - 5th year

Recommended optional programme components:

Mandatory predecessors: BSc-degree. Students enrolling directly to the masters programme should take the Principles of project work course, first.

Recommended or required reading:

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

Assessment methods and criteria:

Project work and seminar; as a team.

Grading:

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

- project management skills (45%)
- expertise in topic area, evaluated from the seminar report (45%)
- oral presentation (10%)

Person responsible:

Samuli Saukkonen

817613S: Project Management in Global Environments, 5 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

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

Ei opintojaksokuvauksia.

811330A: Project management, 5 op

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

Timing:

4th year, period x.

Learning outcomes:

Objectives: The student acts as the project manager in charge of the Project 1 -course project, leading and guiding the project planning, internal project management and supervision, and reporting to the steering group. The department-appointed member of staff acts as the supervisor and a tutor in conjunction with the person in charge of this course.

Learning outcomes: After the successful completion of this course, the student can identify the project management practices from the viewpoint of a project manager, apply them in to practice and manage a team of software engineers in a software project. In addition, the student knows the principal concepts of project management and can analyze his or her own accomplishments as a project manager in relation to those concepts.

Contents:

The student acts as the project manager in charge of the Project 1 -course project. In addition, the student must analyze his or her own work and role as a project manager in relation to the theories of project management, either by producing a written report or attending and presenting his or her analysis in a course seminar.

Learning activities and teaching methods:

project work 130h, seminar attendance / written work 20h.

Recommended optional programme components:

Compulsory prerequisites: Project 1 -course and the Introduction to Project Work -course. This course cannot be taken while completing the Project 1 -course.

Recommended or required reading:

notified during the course, the material from Introduction to Project Work -course serves as a fundamental reference.

Assessment methods and criteria:

The student must participate to the project working by managing the project team at least by the amount of hours specified above, as well as produce a written work (or the corresponding seminar presentation and -attendance).

Grading:

pass / fail

Person responsible:

Jouni Lappalainen

812340A: Real Time Software Design, 6 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Zeeshan Asghar

Opintokohteen kielet: English

ECTS Credits:

6 ECTS

Timing:

4th year, periods 2+3

Learning outcomes:

Objective: The course gives the student the specific ability to develop software for time critical applications, ranging from simple household appliances to safety critical control systems at a nuclear plant. The student will learn to identify time-critical elements in a system. The student will be instructed on a real-time design methodology from the initial requirement phase to the final execution phase, whether the project is a small team effort, or part of a large distributed design group

Learning Outcomes: The students will acquire an object oriented approach to solve the problems found in real-time systems. The students will be aware of the specific problems facing the real-time software designer, and become familiar with the main design patterns to solve those problems. The students will become familiar with tools, mechanisms and platforms for Java and C languages that support real-time system

Contents:

Contents:

- Introduction to Real Time Systems
- Characteristics of Real Time Systems
 - o Timeliness
 - o Resource management
 - o Safety and Reliability
 - o Concurrency
 - o Security
- Methodologies and design patterns for Real time systems
- Real time programming in C/C++
- Real time programming in Java

Learning activities and teaching methods:

Lectures, Group Project.

Recommended optional programme components:

Introduction to Embedded Systems, Object-Oriented Analysis and Design.

Recommended or required reading:

Lecture notes.

Douglass B.P. 1998, Real-Time UML - Developing Efficient Objects for Embedded Systems, Addison-Wesley ISBN 0-201-49837-5.

Assessment methods and criteria:

Exam + Project evaluation.

Grading:

1-5

Person responsible:

Dr. Seamus Hickey

811391A: Requirements Construction, 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

Timing:

3rd year, period 2

Learning outcomes:

Objectives: Requirements elicitation, analysis and documentation techniques will be covered during this course. We will describe the concepts of problem domain and solution domain as characterizing the different viewpoints to requirements. The role of requirements will be discussed in different project and software acquisition situations. Learning Outcomes: By complementing this course, student can analyze the requirements from problem domain and solution domain viewpoint, and understands the special issues associated to these viewpoints. The student can distinguish the roles of problem domain and solution domain requirements for the customer and developer; he 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 of definition styles. Several requirements 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 prioritization. Release planning. Requirements management during the product life-cycle.

Learning activities and teaching methods:

Lectures (40 hours), weekly assignments and project assignment (ca. 100 hours of student work)

Target group:

3rd year

Recommended optional programme components:

We assume the basic skills from the following courses: Principles of information system design, Object oriented analysis and design, Principles of data bases, Software Engineering and Information system design.

Recommended or required reading:

S. Lauesen, Software Requirements - Styles and Techniques. Pearson Education 2002; chapters 1-4 ja 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 the scale 1-5.

Person responsible:

Samuli Saukkonen

813621S: Research Methods, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Jouni Markkula

Opintokohteen kielet: English

Leikkaavuudet:

521146S Research Methods in Computer Science 5.0 op

ECTS Credits:

5 ECTS

Timing:

5th year, period 2+3+4

Learning outcomes:

Objective: The course gives an introduction to the general scientific research principles and empirical research methodology of computer science, information systems and software engineering research. In the course, the

three main research approaches applied in the field are presented: qualitative, quantitative and constructive research. These approaches are introduced with examples of more specific research methods. The course is especially intended for supporting Master's thesis research.

Learning Outcomes: After completion of the course, the student knows general principles of scientific research and practices of scientific methodology. She or he can identify and describe the main research approaches and choose the appropriate one for her or his research problem. The student can apply basic research methods and search for more information for learning and applying new research methods. She or he is also able to evaluate the methodological quality of a research publication.

Contents:

Introduction the general scientific principles, inference and methodology, scientific research practices and quality of scientific publication, qualitative research approach and selected research methods, quantitative research approach and selected research methods, constructive research approach and selected methods, requirements and examples of Master's theses.

Learning activities and teaching methods:

Lectures and exercises

Target group:

5th year

Recommended or required reading:

Lecture slides and specified literature

Assessment methods and criteria:

Lecture diaries, essays or exam & exercises

Grading:

Pass/fail

Person responsible:

Jouni Markkula

814644S: Research on digital media, 10 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Kuutti, Kari Pekka Tapani

Opintokohteen kielet: Finnish

ECTS Credits:

10 ECTS

Timing:

5th year, periods 2+3+4

Learning outcomes:

Objective: Preparation for master thesis work in digital media and HCI

Learning Outcomes: Student knows the field of research on digital media and HCI, and the main corresponding fora of publication. Student can search scientific information and prepare a research plan. Student can select a research topic, an approach suitable for it for a master thesis, and evaluate the feasibility of the plan. He or she can present the plan to others and to discuss about it.

Contents:

The digital media and HCI research field and the main publication fora. Practical examples of research at different levels. Information retrieval and evaluation. Preparation of a research plan, presentation of a plan and evaluation of it.

Learning activities and teaching methods:

Lecture and, exercise work (alternatively an exam based on literature).

Target group:

5th year

Recommended optional programme components:

120 ETC former studies.

Recommended or required reading:

Lecture materials and a selection of research publications.

Assessment methods and criteria:

Exercise work

Grading:

1-5

Person responsible:

Kari Kuutti

813325A: Sales Strategies in Software Business, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Jukka Kontula

Opintokohteen kielet: Finnish

816630S: Scientific paper writing, 1 - 3 op

Voimassaolo: 01.08.2008 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Ei opintojaksokuvauksia.

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

Timing:

2nd - 5th year, periods 1-4

Learning outcomes:

Objective: Small-group tutor guides new students to the academic studies and academic life. The tutor receives experiences in student supervision and guiding, which build important capacities for IT-professional.

Learning Outcomes:

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

1. Draw up supervision plan to his / her small group.
2. Put into effect his / her supervision from the viewpoint of students and based on the given tutor training.
3. Receive supervision and guiding experience.
4. Take responsibility of his / her own supervision work.

Contents:

1. Common training, occasions and meetings, 2. Planning and implementation of small-group tutoring 3. Writing his / her own report diary.

Learning activities and teaching methods:

Lectures, exercises and meetings. Doing as a small-group tutor in co-operation with other tutors, Blanko student organization, library and own department's study-counselors. Independent personal work.

Target group:

2nd - 5th year

Recommended optional programme components:

-

Recommended or required reading:

Training materials, forms and own reports.

Assessment methods and criteria:

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

Grading:

Approved / failed.

Person responsible:

Heli Alatalo

812315A: Software Construction, 10 op

Voimassaolo: 01.08.2014 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

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

Timing:

4th year, period 3+4 (GS3D, 1st year, period 3+4)

Learning outcomes:

The course is an introduction to globally distributed software development. The course introduces the critical factors to the success of the GSD (Global Software Development) and the best practices to enable a successful outcome.

After completion of 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. The student is able to define and evaluate the collaborative technologies, which in the best way support distributed software development, and to choose the methods and tools for distributed software development. The student can also 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 artifact sharing; architectural design; and finally knowledge management issues. The lectures and seminars review also current research aspects of the GSD and related case studies in industry. The exercises demonstrate the distributed software development as a virtual team with the support of appropriate methods and tools.

Learning activities and teaching methods:

Lectures and seminars (30h + 30h preparation), lecture assignments (15h), an empirical student case study report or theoretical report (30h), and exercises (60 h). Empirical student case study reports or theoretical reports are prepared by teams of 2-3 students. The exercises include laboratory demonstrations of different supporting tools for distributed software development. The students train in the project software development and planning practices in distributed environment. The student project groups are organized into virtual (distributed) teams of students (2-3 students per team).

Target group:

The course is obligatory for GS3D students and software engineering students; the total number of students is limited according to the departmental selection rule (valintasääntö, kts. Opinto-opas). 90% attendance is required.

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 (15%), lecture assignments (15%), student case study report or theoretical report (35%), exercises (35%).

Person responsible:

Jouni Similä

813323A: Software Quality and Quality Techniques, 3 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:

3 ECTS

Timing:

4th year, period 2

Learning outcomes:

Objective: The course introduces different perspectives for software quality and provides an introduction to software quality assurance standards, quality techniques and defect classification. The course focuses on reviewing and inspection in particular, but also process improvement with patterns is introduced. The students practice conventional and web-based inspection in small teams and reading technique in individual inspection. Learning Outcomes: After finishing the course the student understands the software quality concept, recognizes quality models and can apply them in software quality measurement. The student knows different review and inspection methods and can inspect software descriptions and use supporting tools. The student knows dependability concept and Musa's reliability engineering. The student knows post-mortem review methods and can apply them.

Contents:

Quality models, review, inspection, inspection process improvement, quality metrics, defect taxonomy, dependability, post-mortem review

Learning activities and teaching methods:

Lectures, study group working, essay, inspection exercises

Recommended optional programme components:

Software engineering, Object oriented analysis and design

Recommended or required reading:

Galin D., Software Quality Assurance: From theory to implementation, Addison-Wesley, 2004
 Gilb T., and Graham D., Software Inspection, Addison-Wesley, Wokingham, England, 1993
 Gillies A.C, Software Quality: Theory and Management, Second edition, International Thomson Computer Press, London, UK, 1997
 Wiegers K.E., Peer Reviews in Software, Addison-Wesley, 2002
 Lecture material http://www.tol.oulu.fi/users/ilkka.tervonen/LaTe_engl.html

Assessment methods and criteria:

Study group working or essay, inspection exercises

Grading:

1-5

Person responsible:

Ilkka Tervonen

813322A: Software Testing, 3 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Kokkonen, Jouni Kalevi

Opintokohteen kielet: Finnish

ECTS Credits:

3 ECTS

Timing:

3th year, period 4

Learning outcomes:

Objective: The course introduces the basic concepts of testing, test planning and reporting, and software testing as part of the software development process at different stages. In addition, we go through various testing techniques and test automation. The course design and testing, practicing various techniques of software testing tools.

Learning Outcomes: After finishing course the student manages basic concepts related to testing and the testing process, he knows the various stages of testing, he knows how the test can be carried out, and he will be able to plan and to re-port to the testing. In addition, after the course the student to know how to test different types of applications and how testing can be automated.

Contents:

Basics of software testing, unit testing, integration testing, system testing, documenting tests, designing tests, test case design, regression testing, object-oriented software testing, quality of Web pages and testing Internet applications, and test metrics

Learning activities and teaching methods:

Lectures and Large exercise or an alternative way (mainly for foreign students)

Recommended optional programme components:

-

Recommended or required reading:

Lecture material and varied literature each year, which is given in the lectures start

Assessment methods and criteria:

Lecture diaries and assignment concerning software testing (Large exercise has been reported by assignment)

Grading:

Pass / Fail

Person responsible:

Jouni Kokkonen

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: Krzanik Lech

Opintokohteen kielet: Finnish

ECTS Credits:

6 ECTS

Timing:

4th year, period 3

Learning outcomes:

Objective: The course is provided within the inter-university OSCu framework. The goal of the course is to provide software architecture concepts and methods. The focus of the architecture solutions is on object oriented systems but general architecture styles, patterns and techniques are considered as well.

Learning Outcomes: On completing the course the students are prepared to develop modular, flexible and reusable software.

Contents:

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

Learning activities and teaching methods:

Lectures: 2-4 hrs. per week, exercises: 2 hrs. per week, hands-on assignment stages 1-3, examination.

Target group:

4th year

Recommended optional programme components:

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 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 (<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 passing thresholds: weekly exercises: 40% tasks; assignment stages 1-3: pass/fail; examination: 15 points.

Grading:

Active participation to exercises, approved assignment, and a positive examination result are necessary to pass the course. The normal grading scale is used; passing threshold is approx. 23 points.

Person responsible:

Lech Krzanik

813608S: Software business case studies, 6 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Seppänen, Veikko Johannes

Opintokohteen kielet: Finnish

Timing:

5th year, period 3+4

Learning outcomes:

Objective: The course aims at familiarizing the student with the software industry and businesses, using case examples and literature. The focus is on the logic of the industry as a whole and on company-level business strategies. The course includes an introduction to the main concepts of industrial logic, business strategy and business models.

Learning Outcomes: The course and case assignments, in particular, aim at acquainting the students not only with identifying important factors in strategic software business management, but also with acquiring, analyzing and utilizing information on the software industry and individual businesses.

Contents:

The main content of the course involves strategies and evolution of different types of software businesses, cross-examined with the help of selected literature and case assignments. There is a special emphasis on strategies that support the growth and internationalization of software companies offering various types of services, solutions and products to their customers.

Learning activities and teaching methods:

Introduction lectures, case group assignments, presentations and review, examination.

Recommended optional programme components:

-

Recommended or required reading:

D.G. Messerschmitt, C. Szyperski, 2003. Software Ecosystem. Understanding an Indispensable Technology and Industry.

MIT Press, 2003. Rajala, R., Rossi, M., Tuunainen, V.P. 2001. Software Business Models. A Framework for Analyzing Software Industry.

Tekes Technology Review 108/2001. Tekes, Helsinki. Cusumano, M. A. 2004. The Business of Software. Free Press, New York. (selected parts)

Assessment methods and criteria:

Passing the exam and completion of the assigned case analysis team work.

Grading:

1-5

Person responsible:

Veikko Seppänen, Karin Väyrynen

813315A: Software business planning, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Karin Väyrynen

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS

Timing:

free

Learning outcomes:

Objective: The course is an introduction to business planning. Preferably, students should already have some knowledge about financial calculations before attending the course. Within the course, students will develop a business idea and will write a business plan for this fictitious business.

Learning Outcomes: After the course, the student should be able to write a business plan. In more detail, the student should be able to:

- identify the core benefit of the product- or service-idea and present it in the business plan
- explain and present the product or service in an understandable, convincing and summarized way
- conduct a market analysis
- segment the market into different customer segments
- estimate the number of potential customers for the product or service in different market segments
- analyze the influence of the number of customers on profit and loss
- choose the market segment with the biggest profit potential
- calculate the expected market share
- develop a marketing strategy
- present the management team, business system and organization of the business in an adequate way
- identify different sources of financing for the business operation
- evaluate the risks involved with the business operation
- conduct financial calculations / calculate the potential profit or loss of the product- or service-idea (considering the costs and revenue of the business)
- make a profit- and loss statement
- make a cash flow calculation
- present the business idea to a potential investor

Contents:

Entrepreneurship, economics, business development, software business, marketing, industry analysis, financial calculations, venture financing.

Learning activities and teaching methods:

Lectures (16h), exercises (20h), exercise assignment (~80h), exam (~20h) In the course, students first develop a software business idea. After having developed the business idea, the students will develop a business plan for that idea. In the lectures, the starting point is the business idea, which is the basis when planning to start up a business. The students will be introduced the elements of a business plan and what to take care about when writing one. The lecture will introduce the business plan on a general basis (for all different kinds of businesses), but will also include information especially important for writing a business plan for a software business. In the exercises, students will develop their business idea at an initial level, and will then develop a business plan based on that idea. They have the possibility to ask for help and will be given feedback on their business plans. The most common problems that arise in the students' business plans will be discussed. In the final exercise, each team presents their business plan to the other students. Most of the business plan the students develop outside the exercises, on their own time.

Recommended or required reading:

Starting up - achieving success with professional business planning (McKinsey 1998, <http://www.scribd.com/doc/4505824/Mckinsey-Starting-Up-Business-Planning-Manual>)

Hurdle - the book on business planning (Timothy J. Barry 2006, <http://www.bplans.com/ho/HurdleBook.pdf>)

Assessment methods and criteria:

Lecture and exercise participation, exercise assignment (teamwork), exercise presentation, maybe exam

Grading:

1-5

Person responsible:

Karin Väyrynen

815623S: Software development with business objects, 5 - 6 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Krzanik Lech

Opintokohteen kielet: English

ECTS Credits:

6 ECTS

Timing:

4th year, period 4

Learning outcomes:

Objective: The objective of this advanced course is to provide business object-based software development concepts and methods. A wide range of common business object models and techniques are discussed.

Learning Outcomes: On completing the course the students are prepared to develop modular, flexible and reusable business object-based software.

Contents:

Fundamentals of Enterprise Application Integration. Business process modeling, engineering and re-engineering. Generative software. The business object software integration model. Business object platforms and business object facilities and frameworks. Popular platforms: EJB, .NET, services, clouds. The Common Business Object recommendations. Sample business domains illustrated.

Learning activities and teaching methods:

Lectures, exercises, hands-on assignment (demonstrator), examination.

Target group:

4th year

Recommended optional programme components:

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, 815347A Software architectures, 81518S Component-Based Software Production).

Recommended or required reading:

P. Herzum, O. Sims, Business Component Factory. Wiley, 2000; C. Lengauer, et al., Domain-Specific Program Generation. Springer, 2004; J. McGovern et al., Enterprise Service Oriented Architectures: Concepts, Challenges, Recommendations. Springer, 2006; Web-pages (<http://www.tol.oulu.fi/users/lech.krzanik/cbsd.htm>).

Assessment methods and criteria:

Lectures, exercises, assignment, examination are evaluated on a point scale. Minimum levels: weekly exercises: 50% of tasks; assignment: pass.

Grading:

The normal grading scale is used. Active participation to exercises, approved assignment, and a positive examination result are necessary to pass the course.

Person responsible:

Lech Krzanik

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

Timing:

2nd year, period 4

Learning outcomes:

Objective: The course introduces Software Engineering as a systematic, disciplined and quantifiable approach to the development and maintenance of software. The student applies the software design methods and software engineering practices in the development of a tiny software application.

Learning Outcomes: After finishing the course the student understands software engineering as an aggregate of process models, requirements, analysis and design methods, quality management and project management. The student knows the practices and activities of software engineering (reviewing, testing, software configuration management, risk management, project management) and is able to apply them at different levels of software development. The student understands the role of maintenance and reengineering in the evolution of software.

Contents:

Software process, software requirements, software design methods, software engineering practices, software quality management, software process management

Learning activities and teaching methods:

Lectures, study group working, essay, exercises, assignment

Recommended optional programme components:

Introduction to information systems analysis and design, Object oriented analysis and design

Recommended or required reading:

Pressman R., Software Engineering, A Practitioner's Approach, 7th edition, McGraw-Hill, 2010, lecture material http://www.tol.oulu.fi/users/ilkka.tervonen/OTE_engl.html

Assessment methods and criteria:

Exam and assignment, exam can be replaced by study group working or essay

Grading:

1-5

Person responsible:

Ilkka Tervonen

815608S: Software engineering research, 10 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Oivo, Markku Tapani

Opintokohteen kielet: Finnish

ECTS Credits:

10 ECTS

Timing:

5th year, periods 2+3+4

Learning outcomes:

Objective: Students will study the most essential and current research topics in software engineering area. Students will also learn practices of scientific communication, structure of research paper, to read critically research papers and to analyse the content of the paper and the research methods used in the paper. Students learn to introduce a research paper and give constructive criticism. The skills learned in the course will be applied to Master's thesis. Student will formulate at the end of the course the first version of the research plan of their Master's thesis and present it in the seminar.

Learning Outcomes: After finishing the course the student knows current research branches in software engineering and the most important research methods. The student is able to analyze scientific articles from the viewpoint of the content and research method used in the article. The student is able to write research plan for the Master thesis.

Contents:

Research branches in software engineering, research methods

Learning activities and teaching methods:

Lectures, assignments related to lectures, presentations, report

Recommended optional programme components:

B.Sc. thesis

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 http://www.tol.oulu.fi/users/ilkka.tervonen/OhjTut_engl.html

Assessment methods and criteria:

Assignments related to lectures, report

Grading:

1-5

Person responsible:

Ilkka Tervonen

813612S: Software process improvement, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Oivo, Markku Tapani

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS

Timing:

4th year, period 2

Learning outcomes:

Objectives: The course covers the most important software process improvement (SPI) methods and standards. The teaching covers both fundamental topics in SPI as well as latest trends. The theory is complemented with practical examples.

Learning Outcomes: After the course the student understands the essential elements and features of software process improvement methods in professional software development. It expands the previous understanding of quality methods mostly based on individual techniques (such as reviews) so that the student can participate in systematic process improvement and management in professional software development. The student

understands the bestknown processcentered approaches and methods of software process and quality improvement as well as the most recent development results in the field.

Contents:

The course covers the following topics: software processes, quality and quality standards, quality of organizational level, process quality, approaches to process improvement, process and software measurement, agile methods, quality improvement on the company level, and examples of practical applications.

Learning activities and teaching methods:

Lectures (30 hours) and weekly assignments

Recommended optional programme components:

We assume the basic skills in software engineering and software development.

Recommended or required reading:

1) Lecture slides. 2) CMMI: Guidelines for Process Integration and Product Improvement. Mary Beth Chrissis, Mike Konrad, Sandy Shrum. Addison-Wesley, ISBN 032-115496-7, 2004. 3) Agile Project Management with Scrum. Ken Schwaber, Microsoft Press, ISBN 0-7356-1993-X. 2004.

Assessment methods and criteria:

Two ways of passing:

- 1) Active participation: weekly assignments and one essay
- 2) Conventional exam

Grading:

Active participation will be evaluated based on the weekly assignments and one essay; the scale will be 1-5. The exam will be evaluated on the scale 1-5.

Person responsible:

Markku Oivo

811388A: Symbian Programming, 4 op

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:

4 ECTS

Timing:

4th year, period 1

Learning outcomes:

Objective: The objective of the course is to increase the understanding of different hardware and software platforms, their commonalities and differences, especially focusing on the Symbian Operating System (OS). The course considers the Symbian OS from the perspective of an application programmer. The course is one of the group of courses focusing on different development platforms.

Learning Outcomes: The student understands the basic architecture, functionality and special features of the Symbian OS. The course is practical, focusing on programming in the Symbian OS.

Contents:

The architecture and versions of the Symbian OS. Development tools and languages. Development process. Programming practices and idioms. Application architecture. Processes and threads. Descriptors. Data structures. Active objects.

Learning activities and teaching methods:

Lectures 20 h, exercises 18 h, exercise work. Independent reading of articles.

Target group:

4th year

Recommended optional programme components:

Compulsory prerequisite course is the Basics of C++ programming language. The Operating systems course (Dept of Electrical Engineering at the Faculty of Technology) is a recommended prerequisite course.

Recommended or required reading:

Harrison: Symbian OS C++ for Mobile Phones, John Wiley & Sons, 2003. Jo Stichbury: Symbian OS Explained, John Wiley & Sons, 2004.

Assessment methods and criteria:

Exercise work.

Grading:

Numerical grading based on the exercise work.

Person responsible:

Antti Juustila

817603S: Systems Design Methods for Global 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: Tero Vartiainen

Opintokohteen kielet: English

Person responsible:

Tero Vartiainen

Compulsory

817603S-01: Systems Design Methods for Global Information Systems, exercise work, 0 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Advanced Studies

Laji: Partial credit

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

Ei opintojaksokuvauksia.

817603S-02: Systems Design Methods for Global Information Systems, exam, 0 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Advanced Studies

Laji: Partial credit

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Tero Vartiainen

Opintokohteen kielet: English

Ei opintojaksokuvauksia.

811390A: Unix Programming, 4 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Henrik Hedberg

Opintokohteen kielet: Finnish

ECTS Credits:

4 ECTS

Timing:

Period 1, opt, 4th - 5th year, compulsory for software engineering students

Learning outcomes:

Objective: The emphasis of the course is in the programming environment and tools of Unix systems, as well as in the utilization of libraries available. In addition, the course covers the essential services of the operating system, and graphical user interface construction. The programming environment is Linux. The course is one of the parallel programming environment courses.

Learning Outcomes: After passing the course, a student knows the essential software development tools of Unix systems, and is able to work in Unix environment with them. The student is able to implement graphical software by exploiting readymade libraries and knowledge of the programming interfaces provided by the operating system.

Contents:

Unix is widespread operating system especially in servers, but the exploitation is in strong growth in workstations again. The usage of Unix in embedded systems, such as in mobile phones, has been spectacular phenomenon lately. That is mostly because of Linux, the free Unix-compatible operating system. The course covers the essential features of Unix-like operating systems from the programming viewpoint.

Learning activities and teaching methods:

Lectures and exercises abt 50 h, exercise work abt 50 h

Target group:

4th - 5th year, compulsory for software engineering students

Recommended optional programme components:

C/C++ programming skills

Recommended or required reading:

Lecture material, the documentation of selected technologies, and other literature

Assessment methods and criteria:

Exercise work

Grading:

1-5

Person responsible:

Henrik Hedberg

813352A: Usability Testing, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Mikko Rajanen

Opintokohteen kielet: Finnish

ECTS Credits:

4 ECTS

Timing:

Period x, 3rd, 4th and 5th year students

Learning outcomes:

Objective: This course gives an introduction to basics of designing and following through a usability testing process.

Learning Outcomes: Student can design and follow through a usability testing process. Student can design usability test scenarios and tasks, select test persons, plan and follow through usability tests, analyze and report the findings from usability tests.

Contents:

Basic terms and types of usability testing, usability testing process, usability test tasks and scenarios, test persons, following through a usability test, analyzing usability test material, reporting the findings from usability tests.

Learning activities and teaching methods:

Lectures, assignment guidance, assignment, seminar.

Target group:

a recommend course in digital media and information systems.

Recommended optional programme components:

Humans as Users and Developers of Information Technology and Introduction to Human-Computer Interaction.

Recommended or required reading:

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:

Assignment, seminar

Grading:

pass/fail

Person responsible:

Mikko Rajanen

817605S: User Information in Service Design, 5 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Kuutti, Kari Pekka Tapani

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

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

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

811345A: Web-information Systems Design, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Katja Leiviskä

Opintokohteen kielet: Finnish

ECTS Credits:

5 ECTS

Timing:

4th year, periods 1+2

Learning outcomes:

Objective: Web-information systems design, techniques and concepts of Web-information systems. The course provides theoretical and practical information of Web-information systems design.

Learning Outcomes: After passing the course, a student understands Web-information systems design, techniques and concepts of Web-information systems. Also a student has a basic knowledge how to design Web-information systems.

Contents:

Web-information systems design, techniques and concepts of Web-information systems.

Learning activities and teaching methods:

Lectures 30 hours, exercises 30 hours

Target group:

4th year

Recommended optional programme components:

Mandatory course : Content creation in new media. A recommended course is Object oriented analysis and design.

Recommended or required reading:

Lecture handouts and Lowe David & Hall Wendy, Hypermedia & the Web: An Engineering Approach, John Wiley & Sons. Richard Vidgen, David Avison, Bob Wood and Trevor Wood-Harper. Developing Web Information Systems, Butterworth-Heinemann, 2002.

Assessment methods and criteria:

A practical work and examination

Grading:

1-5

Person responsible:

Katja Leiviskä

811389A: Windows Programming, 4 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Information Processing Science

Arvostelu: 1 - 5, pass, fail

Opettajat: Ari Vesanen

Opintokohteen kielet: Finnish

ECTS Credits:

4 ECTS

Timing:

4th year, period 4

Learning outcomes:

Objective: The course consists of Windows programming using C programming language. Principal content is programming user interface with Win32 API.

Learning Outcomes: Knowing how user interface is created and how its events are handled in a Windows program. Understanding memory allocation, handling files and the printer in Windows environment.

Ability to construct a Windows program with either Multiple-Document Interface or Tabbed Document Interface applying the previously mentioned topics using Win32 API.

Contents:

1. Introduction and first program, 2. Data types and resources, 3. Basics of graphics programming, 4. Handling keyboard and mouse, 5. Child windows, controls, and dialogs, 6. Memory handling and the clipboard, 7. Internet programming in Windows environment, 8. Multiple-windowed applications, 9. Dynamic-link libraries, 10. Using the printer, 11. Multi-threaded programs

Learning activities and teaching methods:

Lectures 20h and exercises 27h.

Target group:

4th year

Recommended optional programme components:

Operating Systems and Programming in C.

Recommended or required reading:

Petzold: Programming Windows, 5th edition, Microsoft Press 1999.

Assessment methods and criteria:

Programming assignment.

Grading:

Approved/Rejected

Person responsible:

Ari Vesanen