Østfold University College

Study Plan for Master in Applied Computer Science (120 ECTS) (2019–2021)

Facts about the program

ECTS Credits: 120
Study duration: 2 years
Teaching language: English
Campus: Halden

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What do you learn?

Degree/title obtained

Master in Applied Computer Science.

Learning outcomes

Knowledge

The candidate has

- deep knowledge about research and development within the field of applied computer science;
- advanced knowledge about literature and methods used within the field of applied computer science.

Skills

The candidate is able to

- work independently with a problem statement over a long period of time;

- analyze a situation, formulate a problem statement, and develop a plan for solving the problem;
- create models and implement them in a digital environment;
- make realistic and feasible plans by taking into account possibilities, limitations and use of time;
- collect and analyse relevant information as well as having a critical attitude towards sources used;
- present research and results clearly and unambiguous within the field of applied computer science;
- formulate his/her own and other people's reflections and solutions within the field of applied computer science.

General competence

The candidate

- has retained and further developed his/her academic curiosity, knowledge, openness and precision as well as the ability to distinguish between knowledge and opinions;
- is capable of critical reflection on ethical, scientific and philosophical issues within the field of applied computer science;
- has gained knowledge of scientific literature, methods and theories within the field of applied computer science;
- can communicate knowledge clearly in writing as well as orally.

Admission

A bachelor's degree or an equivalent education of at least 180 ECTS credits,

and in addition or included at least 80 ECTS credits in informatics,

and in addition or included at least 20 ECTS credits in programming

To be admitted, the applicant must have an average grade from the qualifying education of at least C.

Applicants from countries outside the EU/EEA must submit proof of funding when submitting their application.

Structure and content

The structure and content of the programme

The master programme in applied computer science is a natural extension of the IT faculty's bachelor studies and builds on the research activities of the faculty staff.

The first semester comprises the following mandatory courses:

- Scientific method and theory (15 ECTS credits)
- Interaction design (15 ECTS credits)

In the second semester the students must select 2 out of 3 electives:

- Machine learning (15 ECTS credits)
- Advanced topics in information systems (15 ECTS credits)
- Modelling cyber-physical systems (15 ECTS credits)

On application students may be permitted to exchange one course in the second semester with a Business project (15 ETCS credits) or a Research project (15 ETCS credits).

In the third semester the students will take the mandatory course Selected Topics (15 ECTS credits), wich is a literature survey relevant to their master's thesis.
In the third and fourth semester the student will do their master's thesis (45 ECTS credits).
In order to qualify for the master's thesis, the student must have passed at least 45 ECTS from the first year of study in addition to the mandatory course Selected topics.

Teaching, learning methods and forms of assessment

Learning partly takes place through seminars and traditional lectures. Additionally it will take other forms:

- student-led seminars
- projects

Each student's benefit from this type of organisation will depend on the student's own efforts and interest. The student must show interest in his/her professional development, and must be able to work independently with theory, implementation and knowledge acquisition. The students are offered supervision in all courses of the master programme.

Master students are expected to take initiatives and approach tutors, and be responsible for their own learning.

Most courses and assignments are ICT-based, using various IT tools for exchange of information, submission of assignments, tests, etc. Østfold University College may demand that the student has a laptop at his/her disposal.

Østfold University College's Makerspace, a well-equipped lab with tools, materials, components and kits, is available for the students 24 hours, 7 days a week. This is a playground for students who like to create something using technology. Makerspace is also an arena for lectures, courses and experiments.

A modern library is at the students' disposal. The library helps the students in developing their information competence, i.e. the ability to search, find, evaluate and use relevant information. In addition to personal service the students are offered library courses on international databases and evaluation of information quality. They are also offered courses in scientific referencing.

Compulsory assignments
Some of the courses have requirements for attendance and/or compulsory assignments, exercises and projects. These assignments have to be completed and approved before taking the final examination. More details regarding compulsory assignments are found in the course descriptions.

Academic writing
The students will be trained in academic writing throughout the study programme. This is done by emphasising content, structure, reliability, and referencing.

Continuous feedback
The taught courses include exercises, assignments and projects, completed either individually or in groups. The students are given feedback on all exercises, assignments and projects.

Assessement
Final assessment takes several forms: written individual examination, portfolio assessment, project assessment, oral examination, or a combination of these.

The grading scale normally used is the A - F scale although some courses may use the assessment "Bestått/Ikke bestått" (Pass/Fail).

Upon agreement with the instructor you may in some cases use Norwegian for your handins and/or exams.

More details regarding assessment are found in the course descriptions.

Plagiarism control/ cheating
Bachelor's and Master's theses are subject to electronic plagiarism control, as may also be the case with other courses and required coursework. Exam papers that are partly or entirely identical will not be approved and will be regarded as cheating. For further information please see Exam regulations for Østfold University College.

Research and development work

The master programme is based on the research activity of the faculty, but is also contributing to our research.
All courses in the first year is directly related to the research performed at the faculty. This implies that our courses are continually developed and always up to date.

The master theses are always based on research and development performed at the faculty or at one of our partners. The students become part of the R&D-groups, and the theses have on several occasions led to scientific publications.

Internationalisation

The international aspect is taken care of by the use of international literature and several members of the academic staff have close contacts with foreign institutions and research environments.
The language of instruction is entirely in English, and therefore accommodates the needs of foreign students.

Programme evaluation

We are in need of feedback from our students, and that you participate in the different evaluations that we arrange. This study programme is regularly evaluated by the students to ensure and develop the quality of the programme:

- Every year NOKUT (the Norwegian Agency for Quality Assurance in Education) initiates a nationwide survey among all second-year students in every bachelor- and master programme. The results are published at Studiebarometeret.no.
- The university college performs evaluation of their study programmes at regular intervals.
- The Faculty of Computer Sciences performs evaluations of each course by performing mid-term evaluations.

Reading list

See separate course descriptions.
Course literature is subject to change until 1st of June for autumn courses, and 1st of December for spring courses.

Studies abroad

Students may take their second semester of their studies at a university abroad. Both the International Coordinator at the faculty as well as HiØ's International Office help accommodate studies abroad. Detailed information on exchange opportunities at universities abroad can be found on HiØ's international pages.

Work and future studies

The master's programme qualifies for PhD-studies in Norway and abroad. Different admission requirements may apply at different universities.

A master degree from us provides opportunities for leading positions within application development, web development, consulting and project management in leading IT companies in Norway and abroad. It also qualifies for work in the public sector, for instance in the fields of research and education.

The study plan is approved and revised

The study plan is approved

Dean Beathe Due, 6. April 2015

The study plan is revised

Head of Studies, Monica Lind Kristiansen, December 14, 2018

The study plan applies to

2019 - 2021

Programme Coordinator

Faculty of Computer Science, Engineering and Economics.
Head of Studies, Monica Lind Kristiansen

Study model

This study model has a new design. Let us know what you thing about it

Autumn 2019

Core courses

ITI46518 Scientific Method and Theory	**15** stp
ITI46318 Interaction Design	**15** stp

Spring 2020

Choose 2 of these courses:

ITI43210 Machine Learning	**15** stp
ITI43414 Advanced topics in information systems	**15** stp
ITI43517 Modelling Cyber-Physical Systems	**15** stp

Business project

ITI49018 Business project	**15** stp

Research project

ITI49114 Research project	**15** stp

Autumn 2020

Core courses

ITI40314 Selected Topics	**15** stp
ITI40614 · Part 1 of 2 Master's Thesis	

Spring 2021

Core courses

ITI40614 · Part 2 of 2 Master's Thesis	**45** stp

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Østfold University College

ITI46518 Scientific Method and Theory (Autumn 2019)

Facts about the course

ECTS Credits: 15
Responsible department: Faculty of Computer Science
Campus: Halden
Course Leader: Cathrine Linnes
Teaching language: English
Duration: ½ year

Table of contents

The course is connected to the following study programs

Mandatory course in the master programme in applied computer science full time and part time.

Lecture Semester

First semester (autumn) in the full time programme.

First or third semester (autumn) in the part time programme.

The student's learning outcomes after completing the course

Knowledge
The student is knowledgeable about central methods and theories within the field of applied computer science, and different perspectives on the use of informatics in the society. This includes:

- Research design and experiment techniques
- Statistical methods
- Methods for design and evaluation of information systems
- Social science methodologies
- Data, analysis and modelling techniques
- Research and development activities at the faculty and its partners

The student is familiar with publishing channels relevant to applied computer science, different types of publications, their roles and functions.

Skills
The student is able to:

- assess scientific literature within the field of applied computer science
- use and review scientific references
- use relevant statistical methods for analysing data
- use methods from social sciences and work with observation and interviews
- use methods for design and evaluation of IT systems
- think critically about the use of information technology deployed in organizations and in the society in general

General competence
After examination, the student has a sufficient understanding of applied computer science and the faculty's research and development activities. The student also has a better understanding of the use of IT in our society.

Content

This course is designed for entering computer science graduate students. The course:

- acquaints students with the theories of current and historical importance.
- introduces or reinforces the tenets of the scientific method.
- introduces the faculty, previews key concept areas being taught in the program.
- discusses research designs and methods appropriate to the computer science program.
- introduces students to the hardware, software, and communication skills to be used throughout the program of studies.

Forms of teaching and learning

Lectures, presentations of scientific work, and lab exercises.

Workload

Four 2-days sessions during daytime, a total of 8 days. Between the sessions, supervision is given. Approx 400 hours.

Examination

Portfolio and individual written exam. The exam consists of both a portfolio and an individual written exam. The portfolio counts 60% and consists of:

- Two research projects

- One idea paper

The individual written exam counts 40% and is based on the course curriculum. Duration 2 hours. No supporting materials permitted.

Both parts of the exam must be passed to pass the exam as a whole.

Assessment on the A - F grading scale.

Examiners

The exam is assessed by the course instructor and an internal or external examiner.

Conditions for resit/rescheduled exams

Upon re-examination, each part of the examination can be retaken.

Course evaluation

This course is evaluated by a

- Mid-term evaluation (compulsory)

The responsible for the course compiles a report based on the feedback from the students and his/her own experience with the course. The report is discussed by the study quality committee of the faculty of Computer Sciences.

Literature

Last updated 17.04.2018. The reading list may be subject to change before the semester starts. The following textbook is required for this course:

- Salkind, N.J. (2016). Exploring Research (9th ed), ISBN: 978-1292156293.
- APA. (2009). Publication Manual of the American Psychological Association (6th ed), ISBN: 978-1433805615

Additional course material will be posted on the learning platform.

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ITI46318 Interaction Design (Autumn 2019)

Facts about the course

ECTS Credits: 15
Responsible department: Faculty of Computer Science, Engineering and Economics
Campus: Halden
Course Leaders: Klaudia Carcani, Susanne Koch Stigberg
Teaching language: English
Duration: ½ year

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The course is connected to the following study programs

Mandatory course in the master programme in applied computer science full time and part time.

Lecture Semester

First semester (autumn) in the full time programme.

First or third semester (autumn) in the part time programme.

The student's learning outcomes after completing the course

Knowledge

The student is familiar with

- central theories and models in interaction design
- the development of the field, interaction design and emerging trends

Skills

The student is able to

- design and conduct experiments with new and existing technology for interaction between humans and machines
- relate own work to existing literature, theories and models
- read and reflect on interaction design literature

General competence

Through the course, the student has gained competence in critical reading and reflection. In addition, the student has got experience with project work in groups.

Content

The course consists of three parts:

- Theories and models in interaction design
- Current trends in interaction design
- Methods for design, prototyping and evaluation

Forms of teaching and learning

In the first part of the course, the students will be given lectures comprising the teory in the course. In the second part, the students will work on their projects. Supervision will be given throughout the semester.

Emphasis will be put on reading and using relevant literature, and presentation of own work.

Workload

Lectures and supervision 4 hours per week. Approx 400 hours.

Coursework requirements - conditions for taking the exam

The student must during the semester:

- present at least one paper from the reading list (individual or in a group) and lead a plenary discussion based on this.
- complete and present at least one group project which includes design, prototyping and evaluation of new or existing technology for human-computer interaction.

Coursework requirements must be accepted to qualify for the exam.

Examination

The exam is divided into two parts: Individual written exam (50%) Individual written exam based on the course curriculum. Duration 4 hours. No supporting materials allowed.**Scientific paper in groups (50%)** Scientific paper based on the group project.Grading scale A - F in both parts.

Both parts of the exam must be passed to pass the exam as a whole.

Examiners

The exam is assessed by the course instructor and an internal or external examiner.

Conditions for resit/rescheduled exams

Upon re-examination, each part of the examination can be retaken.

Course evaluation

This course is evaluated by a

- Mid-term evaluation (compulsory)

The responsible for the course compiles a report based on the feedback from the students and his/her own experience with the course. The report is discussed by the study quality committee of the faculty of Computer Sciences.

Literature

Last updated 15.12.2016. The reading list may be subject to change before the semester starts.

- Rogers, Preece and Sharp (2015): Interaction Design: Beyond Human - Computer Interaction. Wiley, 4th ed. ISBN: 9781119020752

The curriculum will be supported by material (scientific papers) during the semester. The material will be posted on the learning platform.

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Østfold University College

ITI43210 Machine Learning (Spring 2020)

Facts about the course

ECTS Credits: 15
Responsible department: Faculty of Computer Science, Engineering and Economics
Course Leader: Roland Olsson
Teaching language: English
Duration: ½ year

Table of contents

The course is connected to the following study programs

Elective course in the master programme in applied computer science full time and part time.

Lecture Semester

Second semester (spring) in the full time programme.

Second or fourth semster (spring) in the part time programme.

The student's learning outcomes after completing the course

Knowledge

The student has

- an overview over the most important methods in machine learning, and a deeper knowledge of three of them, viz. Decision Trees, Neural Networks, and Evolutionary Computation
- knowledge about the practical challenges in connection with data mining, e.g. overfitting, missing values, and classifications with different costs.
- gained knowledge in basic topics such as numerical optimisation and statistical methods, for example Bayesian methods used in search engines like Google and in spam filters.

Skills

The student is able to

- arrange or code data to fit data mining and machine learning algorithms
- choose correct tools for a given type of data
- decide on how good the results are based on simpel statistical analysis of, for instance, classification exactness
- use machine learning i practical applications and be able to transfer machine learning models to programming language code

General competence

The student has improved his/her competence in

- research and development, for instance finding relevant literature and understand scientific articles about machine learning
- writing scientific texts in English
- treat and analyse data of arbitrary type, even if this is done without inductive learning

Content

Machine learning is about computers learning through training and experience instead of being explicitely programmed for a given task. The students will get acquainted with several methods and algorithms for machine learning. Based on this, the students should be able to select the methods best suited for the problem in question.

The course should give the students knowledge about the basic properties common to all machine learning methods. Examples include ability to generalise and heuristic search.

The course contains three projects, one about decision trees, rules and regression analysis, one about neural networks, and one about evolutionary computation.

Induction of decision trees and some applications such as medical diagnosis and credit evaluation.

Artificial neural nets and optimization algorithms such as steepest descent and trust region Newton methods. Applications of neural nets to sound and image analysis.

Basic theory for machine learning, for example Bayes' formula, maximum likelihood and the minimum description length principle.

Instance based learning such as nearest neighbour, locally weighted regression, and radial basis functions.

Evolutionary computation, especially genetic algorithms and genetic programming. General principles for evolution. Selection methods and genetic operators such as mutation and crossover. The Baldwin effect.

Some of the topics above require basic knowledge of statistics and information theory which will be taught as needed.

Forms of teaching and learning

Lectures and supervision.

Workload

2 hours lectures per week and projects with mandatory meetings with the supervisor every week. Approx 400 hours.

Examination

Portfolio and take home exam

The exam consists of both a portfolio and a take home exam.

The portfolio (determines 65 % of the final grade) consists of:

- one project on decision trees
- one project about neural nets
- one project in automatic programming

The projects can be carried out individually or in groups of two students. The students will get an individual grade.

The three day home exam determines 35 % of the final grade and focus on theory. The home exam can be carried out individually or in groups of two students. The students will get an individual grade.

Both parts of the exam must be passed to pass the exam as a whole. The student will get an individual joint grade for the entire course. Grades: A - F.

Examiners

The exam is assessed by the course instructor and an internal or external examiner.

Conditions for resit/rescheduled exams

Upon re-examination, both parts of the examination must be retaken. Upon re-examination, new assignments and the take home exam will be decided by the course instructor.

Course evaluation

This course is evaluated by a

- Mid-term evaluation (compulsory)

The responsible for the course compiles a report based on the feedback from the students and his/her own experience with the course. The report is discussed by the study quality committee of the faculty of Computer Sciences.

Literature

Last updated 15. October 2015. The reading list may be subject to change before the semester starts.

Kuhn, Max og Johnson, Kjell, "Applied Predictive Modeling" (2013), 1st Ed., Springer-Verlag New York, ISBN 978-1-4614-6848-6

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Østfold University College

ITI43414 Advanced topics in information systems (Spring 2020)

Facts about the course

ECTS Credits: 15
Responsible department: Faculty of Computer Science, Engineering and Economics
Course Leader: Ricardo Colomo-Palacios
Teaching language: English
Duration: ½ year

Table of contents

The course is connected to the following study programs

Elective course in the master programme in applied computer science full time and part time.

Lecture Semester

Second semester (spring) in the full time programme.

Second or fourth semester (spring) in the part time programme.

The student's learning outcomes after completing the course

Knowledge

The student

- is familiar with principles for sustainable information systems
- is familiar with the use of IT in businesses
- is familiar with hybrid IT management (including cloud computing)
- has a good overview of health informatics
- is familiar with global trends in information systems management and development

Skills

The student is able to develop a strategy for the deployment of an information system in a business.

General competence

The student is able to apply scientific theory and methodology in a practical business setting.

Content

- Energy Informatics
- Health IT
- Information Systems in a global world
- IT Governance
- New trends in Business Software (Cloud Computing, Hybrid IT)
- Information Systems Development: Improvement & Capability
- Big Data Acquisition, Storage, Analysis & Visualization. An information systems perspective.

Forms of teaching and learning

Ordinary lectures, video lectures, supervision and project work.

Workload

Approx. 400 hours.

Examination

Scientific paper and individual oral exam

The students need to develop a scientific paper on a selected topic. The topic is chosen by the students and agreed with the course responsible. The paper can be developed individually or in groups (maximum two members). The students are given an individual tentative grade on the paper using the A - F grading scale. This grade can be adjusted up to 2 stages at the oral exam.

The individual oral exam is based on regular topics in the course, aspects of the paper developed and a case. Duration approx. 20-30 min. No supporting materials allowed.

If the student decides to challenge the assessment, the scientific paper must be re-assessed. If the new assessment affects the tentative grading of the paper, a new oral exam will be arranged.

Examiners

The exam is assessed by the course instructor and an internal or external examiner.

Course evaluation

This course is evaluated by a

- Mid-term evaluation (compulsory)

The responsible for the course compiles a report based on the feedback from the students and his/her own experience with the course. The report is the discussed by the study quality committee of the faculty of Computer Sciences.

Literature

Last updated 13.12.2016. The reading list may be subject to change before the semester starts.

1. IT for Green / Energy Informatics.

Bose, R., & Luo, X. (2011). Integrative framework for assessing firms' potential to undertake Green IT initiatives via virtualization-A theoretical perspective. The Journal of Strategic Information Systems, 20(1), 38-54.

Brooks, S., Wang, X., & Sarker, S. (2012). Unpacking green IS: a review of the existing literature and directions for the future. In Green Business Process Management (pp. 15-37). Springer Berlin Heidelberg.

Colomo-Palacios, R. (2015). IT for Green, a Global Perspective. Journal of Global Information Technology Management, 18(1), 1-5. http://dx.doi.org/10.1080/1097198X.2015.1017399

Faucheux, S., & Nicolaï, I. (2011). IT for green and green IT: A proposed typology of eco-innovation. Ecological Economics, 70(11), 2020-2027.

Gholami, R., Sulaiman, A. B., Ramayah, T., & Molla, A. (2013). Senior managers' perception on green information systems (IS) adoption and environmental performance: Results from a field survey. Information & Management, 50(7), 431-438.

Molla, A., & Abareshi, A. (2012). Organizational green motivations for information technology: empirical study. Journal of Computer Information Systems, 52(3), 92-102.

Murugesan, S. (2008). Harnessing green IT: Principles and practices. IT professional, 10(1), 24-33.

Naumann, S., Dick, M., Kern, E., & Johann, T. (2011). The greensoft model: A reference model for green and sustainable software and its engineering. Sustainable Computing: Informatics and Systems, 1(4), 294-304.

Watson, R. T., Boudreau, M. C., & Chen, A. J. (2010). Information systems and environmentally sustainable development: energy informatics and new directions for the IS community. MIS quarterly, 23-38.

2. Health IT.

Chatterjee, S., LeRouge, C. M., Chiarini Tremblay, M. (2013). Educating Students in Healthcare Information Technology: IS Community Barriers, Challenges, and Paths Forward. Communications of the Association for Information Systems, 33, Article 1.

Chiasson, M. W., & Davidson, E. (2004). Pushing the contextual envelope: developing and diffusing IS theory for health information systems research. Information and Organization, 14(3), 155-188.

Leviss, J., Kremsdorf, R., & Mohaideen, M. F. (2006). The CMIO-A new leader for health systems. Journal of the American Medical Informatics Association,13(5), 573-578.

Wager, K. A., Lee, F. W., & Glaser, J. P. (2013). Health care information systems: a practical approach for health care management. John Wiley & Sons.

Ward, R. (2013). The application of technology acceptance and diffusion of innovation models in healthcare informatics. Health Policy and Technology, 2(4), 222-228.

Wilson, E.V., & Tulu, B. (2010). The Rise of a Health-IT Academic Focus. Communications of the ACM, (53)5, 147-150.

3. Information Systems function in a Global world.

Campagnolo, G. M., Pollock, N., & Williams, R. (2015). Technology as we do not know it: The extended practice of global software development. Information and Organization, 25(3), 150-159.

Djavanshir, G. R. (2005). Surveying the risks and benefits of IT outsourcing. IT professional, 7(6), 32-37.

Elmuti, D. (2003). The perceived impact of outsourcing in organizational performance. Mid-American Journal of Business, 18(2),33-41.

Grover, V., Cheon, M. J., & Teng, J. T. (1996). The effect of service quality and partnership on the outsourcing of information systems functions. Journal of Management Information Systems, 89-116.

Hirschheim, R., & Dibbern, J. (2009). Outsourcing in a Global Economy: Traditional Information Technology Outsourcing, Offshore Outsourcing, and Business Process Outsourcing. In Information Systems Outsourcing (pp. 3-21). Springer Berlin Heidelberg.

Kendrick, R. (2009). Outsourcing IT: A Governance Guide. It Governance Ltd.

Marchewka, J. T., & Oruganti, S. (2014). A Combined Model of IT Outsourcing Partnerships and Success. Communications of the IIMA, 13(2), 6.

Niazi, M., Mahmood, S., Alshayeb, M., Qureshi, A. M., Faisal, K., & Cerpa, N. (2016). Toward successful project management in global software development. International Journal of Project Management, 34(8), 1553-1567.

Rainer, R.K., Prince, B., & Cegielski, C. (2014). Introduction to Information Systems, 5th Edition. John Wiley & Sons.

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Vandermerwe, S., & Rada, J. (1989). Servitization of business: adding value by adding services. European Management Journal, 6(4), 314-324.

4. IT /Business Alignment.

Chan, Y. E., & Reich (2007). IT alignment: What have we learned? Journal of Information Technology, 22(4), 297-315.

Henderson, J. C., & Venkatraman, N. (1993). Strategic Alignment: A Model for Organizational Transformation through Information Technology. IBM Systems Journal, 32 (1), 4-16.

Khaiata, M. & Zualkernan, I.M. (2009) A Simple Instrument to Measure IT-Business Alignment Maturity, Information Systems Management, 26(2), 138-152.

Luftman, J. N. (2004). Managing the Information Technology Resources. New Jersey: Pearson Prentice Hall.

Luftman, J. (2000). Assessing business-IT alignment maturity. Communications of AIS, Volume 4, Article 14.

Luftman, J. and Brier, T., (1999) 'Achieving and Sustaining Business-IT Alignment,' California Management Review, No. 1, Fall 1999, pp 109-122.

Tallon, P., & Kraemer, K. (2007). Fact or fiction? A sense making perspective on the reality behind executives' perceptions of IT business value. Journal of Management Information Systems, 24(1), 13-54.

Ullah, A., & Lai, R. (2013). A Systematic Review of Business and Information Technology Alignment. ACM Transactions on Management Information Systems, Vol. 4, No. 1, Article 4.

5. IT Governance.

Calder, A. (2005). 'IT Governance - Guidelines for Directors'. IT Governance Ltd.Calder, A. (2009). 'IT Governance Implementing Frameworks and Standards for the Corporate Governance of IT'. IT Governance Ltd.

Juiz, C., & Toomey, M. (2015). To govern IT, or not to govern IT?. Communications of the ACM, 58(2), 58-64.

Peterson, R. R. (2003). Information strategies and tactics for Information Technology governance. In W. Van Grembergen (Ed.), Strategies for Information Technology Governance. Hershey, PA: Idea Group Publishing.

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Weill, P. (2004) 'Don't Just Lead Govern: How Top-Performing Firms Govern IT', MIS Quarterly Executive (3)1, pp. 1-17.

6. New Trends in Business Software.

Bosch, J. (2009). From software product lines to software ecosystems. In Proceedings of the 13th International Software Product Line Conference (pp. 111-119). Carnegie Mellon University.

Bosch, J. (2011). Software Ecosystems--Implications for Strategy, Business Model and Architecture. In Software Product Line Conference (SPLC), 2011 15th International (pp. 351-351). IEEE.

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Heredia, A., & Colomo-Palacios, R. (2015). Software Business Models from a distribution perspective: A Systematic Mapping Study. Unpublished.

Hohmann, L. (2003). Beyond Software Architecture: Creating and Sustaining Winning Solutions. Addison-Wesley Longman publishing Co., Inc., Boston, MA, USA, 2003. ISBN 0201775948.

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Østfold University College

ITI43517 Modelling Cyber-Physical Systems (Spring 2020)

Facts about the course

ECTS Credits: 15
Responsible department: Faculty of Computer Science, Engineering and Economics
Campus: Halden
Course Leader: Øystein Haugen
Teaching language: English
Duration: ½ year

Table of contents

The course is connected to the following study programs

Elective course in the master programme in applied computer science full time and part time.

Lecture Semester

Second semester (spring) in the full time programme.

Second or fourth semester (spring) in the part time programme.

The student's learning outcomes after completing the course

Knowledge

The student

- understands the challenges associated with cyber-physical systems
- has experienced the relevance of good software design principles

Skills

The student has the capability to

- model and implement reactive systems with concurrency
- perform analysis of consistency of models of systems with concurrency
- connect sensors, actuators and controlling components in a functioning system
- give and take constructive criticism of the system design and functioning
- receive the experience of building a cyber-physical system and making it execute

General competence

The student

- can build systems in «Internet of Things»
- can assess realistically what errors may occur in cyber-physical systems and how to minimize their vulnerability
- has some insight into formal semantics of sequence diagrams

Content

The course focus on how reactive systems can be built with emphasis on modeling. The models are executable and based on state machines. The requirements of these concurrent systems are modeled as sequence diagrams, and it is emphasized that the requirements and design are consistent.

In particular, we emphasize reactive systems using the Internet of Things, and we use a running example where the functionality is enhanced during the course following an agile method.

Towards the end of the course, we show how systems can be made more resilient to unexpected incidents and errors. Security of cyber-physical systems and how to perform risk-analysis of such systems will be covered.

Forms of teaching and learning

Project work, lectures and guided lab and exercises.

For each instance of the course, we create new project tasks. We teach the project teams how to give and take constructive feedback.

Workload

3 compact sessions of 2 full days each and 1 full day session. Between the sessions the students will work on the mandatory project and supervision will be offered. Approx 400 hours.

Coursework requirements - conditions for taking the exam

- Mandatory project: There will be one project, with deliverable at each teaching session (2 deliverables). Project group size should be 2-4 people, but with few students, single person project will be possible. The students should expect to spend 100 hours on the project.
- Plenary presentation and evaluation of the project. The project should normally result in an executable model that should be demonstrated at the plenary presentation.

Coursework requirements must be accepted to qualify for the exam.

Examination

Individual oral exam:

Individual oral exam based on the course curriculum and mandatory exercises. Approximately 30 minutes duration. No supporting materials allowed.

Assessment on the A - F grading scale.

Examiners

The exam is assessed by the course instructor and an internal or external examiner.

Course evaluation

This course is evaluated by a

- Mid-term evaluation (compulsory)

The responsible for the course compiles a report based on the feedback from the students and his/her own experience with the course. The report is discussed by the study quality committee of the faculty of Computer Sciences.

Literature

A number of articles and lecture notes constitute the curriculum. The articles and notes will be posted on the learning platform.

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Østfold University College

ITI49018 Business project (Spring 2020)

Facts about the course

ECTS Credits: 15
Responsible department: Faculty of Computer Science, Engineering and Economics
Campus: Halden
Course Leader: Jan Høiberg
Teaching language: English
Duration: ½ year

Table of contents

The course is connected to the following study programs

Elective course after application in the master programme in applied computer science. Full time and part time

Lecture Semester

Second semester (spring) in the full time programme.

Second or fourth semester (spring) in the part time programme.

In addition the student is expected to do some work during the summer vacation.

The student's learning outcomes after completing the course

Knowledge
The student

- knows how research results are generated and reported
- understands advanced theory and practice within the selected topic
- is aware of important principles of research ethics / academic honesty

Skills
The student is able to acquire in-depth knowledge in the chosen topic using scientific working methods, e.g. getting knowledge from literature search combined with own previous knowledge and apply this knowledge to a practical problem.

General competence
The student is able to complete a larger, independent project, including reporting partial results and writing a final report according to professional and scientific standards.

Content

An agreement between the student and the company must be made before the student can attend this course. The agreement must be approved by the Head of Studies before the project starts.

A description of the business project should be prepared by the student and the company in collaboration. This must be endorsed by the faculty before the work starts. This is done to ensure necessary volume and depth in the project.

Forms of teaching and learning

Project work with guidance from a mentor at the company and a supervisor at Østfold University College.

Workload

Approx. 400 hours.

Coursework requirements - conditions for taking the exam

Coursework requirements - conditions for taking the exam

- Deliver a preliminary project report within two weeks after starting the project.
- Prepare and conduct meetings with mentor and supervisor at least once every month, including writing abstracts and logging working hours.
- Present the project at half time (approximately 200 hours). This includes delivering a mid-term report.

Coursework requirements must be accepted to qualify for the exam.

Examination

Project report and individual oral exam

The assessment is based on the project report and an individual oral exam. The project report is graded on the A - F grading scale. It is given a tentative grade of the report. This grade can be adjusted up to 2 stages at the oral exam.

The individual oral exam consists of a presentation and discussion of the project report. Duration approx. 20-30 min. Except the presentation, no supporting materials are allowed.

If the student decides to challenge the assessment, the project report must be re-assessed. If the new assessment affects the tentative grading of the report, a new oral exam will be arranged.

Examiners

The exam is assessed by the course instructor and an internal or external examiner.

Conditions for resit/rescheduled exams

In case of re-examination, a new project must be carried out in agreement with the course instructor and the company.

Course evaluation

This course is evaluated by a

- Mid-term evaluation (compulsory)

The responsible for the course compiles a report based on the feedback from the students and his/her own experience with the course. The report is discussed by the study quality committee of the faculty of Computer Sciences.

Literature

Depends on the project and is agreed on with the supervisor and the company.

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Østfold University College

ITI49114 Research project (Spring 2020)

Facts about the course

ECTS Credits: 15
Responsible department: Faculty of Computer Science, Engineering and Economics
Campus: Halden
Course Leader: Jan Høiberg
Teaching language: English
Duration: ½ year

Table of contents

The course is connected to the following study programs

Elective course after application in the master programme in applied computer science.

Lecture Semester

Second semester (spring) in the full time programme. Second or fourth semester (spring) in the part time programme.

The student's learning outcomes after completing the course

Knowledge

The student:

- has in depth knowledge of one research project at the faculty or at a partner institution.

- has thorough understanding of the relevant field of research.
- is familiar with relevant publishing channels.
- is familiar with relevant methods and theories.

Skills

The student is able to:

- write a scientific paper aimed at publishing.
- defend the choice of research problem and methods.
- define a research problem.
- design and perform a scientific experiment.

General competence

The student gains experience

- with collaboration with internal or external researchers.
- in research, including planning, performing and reporting in an existing research project.

Content

Student and supervisor agree on a theme related to existing research at the faculty or a partner institution.

Regular supervision and practical project work constitute a major part of the course.

Forms of teaching and learning

Reading, project work, reporting, debate and discussion.

Workload

No regular lectures. Regular meetings with supervisor. Approx 400 hours.

Coursework requirements - conditions for taking the exam

- Project description essay in the beginning of the semester
- Mid-term report
- Work log

Coursework requirements must be accepted to qualify for the exam.

Examination

Paper and individual oral exam

The assessment is based on the paper and an individual oral exam. The paper (approx. 10-20 pages) is graded on the A - F grading scale. It is given a tentative grade of the paper. This grade can be adjusted up to 2 stages at the oral exam.

The individual oral exam consists of a presentation and discussion of the paper. Duration approx. 20-30 min. Except the presentation, no supporting materials are allowed.

If the student decides to challenge the assessment, the paper must be re-assessed. If the new assessment affects the tentative grading of the paper, a new oral exam will be arranged.

Examiners

The exam is assessed by an internal or external examiner in consultation with the supervisor.

Conditions for resit/rescheduled exams

Upon re-examination, both parts of the examination must be retaken. Upon re-examination, a new topic will be decided in cooporation with the person responsible for the course and the supervisor.

Course evaluation

This course is evaluated by a

- Mid-term evaluation (compulsory)

The responsible for the course compiles a report based on the feedback from the students and his/her own experience with the course. The report is discussed by the study quality committee of the faculty of Computer Sciences.

Literature

Literature is selected by the supervisor and the student based on the project theme.

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Østfold University College

ITI40314 Selected Topics (Autumn 2020)

Facts about the course

ECTS Credits: 15
Responsible department: Faculty of Computer Science
Campus: Halden
Course Leader: Jan Høiberg
Teaching language: English
Duration: ½ year

Table of contents

The course is connected to the following study programs

Mandatory course in the master programme in applied computer science full time and part time.

Absolute requirements

The student must have passed at least 45 ECTS credits before starting the course selected topics.

Lecture Semester

First half of third semester (autumn - to the middle of October) in the full time programme.

Fifth semester in the part time programme.

The student's learning outcomes after completing the course

Knowledge

The student has attained acquaintance and knowledge about the content of literature relevant for the themes of the master thesis.

Skills

The student is able to account for, both orally and in writing, the content of literature relevant for the themes of the master thesis.

General competence

The student is able to write academic texts.

Content

The course aims at preparing the student for his/her master thesis. The content is chosen individually and is related to the master project.

The student shall, together with his/her supervisor, find literature (books, articles, webpages) that is relevant for the master project. The student shall produce a report summing up this literature and give an oral presentation of the report.

Forms of teaching and learning

Guided self-study.

Workload

Approx. 450 hours.

Coursework requirements - conditions for taking the exam

The student must attend a mandatory seminar in academic writing and a library course.

Coursework requirements must be accepted to qualify for the exam.

Examination

Individual report and oral exam

The assessment is based on two parts:

- An individual report summing up the literature (books, articles, webpages) that is relevant for the student's selected topic.
- An individual oral exam, where the student presents and discusses his/her selected topic. Duration approx. 20-30 min. Except the presentation, no supporting materials are allowed.

In both parts, the grading is individual with a "pass / no pass" mark.

The report must be assessed to "pass" before an oral examination can be conducted. The result "no pass" can be appealed. If the result is changed to "pass", an oral exam will be arranged.

Both parts of the exam must be passed to pass the exam as a whole.

Examiners

External and internal examiner, or to internal examiners

Conditions for resit/rescheduled exams

Upon re-examination, new literature must be decided in cooperation with supervisor.

Literature

Individually chosen.

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Østfold University College

ITI40614 Master's Thesis (Autumn 2020–Spring 2021)

Facts about the course

ECTS Credits: 45
Responsible department: Faculty of Computer Science, Engineering and Economics
Campus: Halden
Course Leader: Jan Høiberg
Teaching language: English
Duration: 1 year

Due to Covid-19 there can be changes to the course descriptions during the spring semester of 2021. Any changes in work requirements and examination form are published continuously in Studentweb. Other changes related to teaching will be communicated via other official channels.

Table of contents

The course is connected to the following study programs

Mandatory course in the master programme in applied computer science full time.

Absolute requirements

The student must have passed the course Selected Topics.

Lecture Semester

Third and fourth semester (autumn and spring) in the full time programme.

The student's learning outcomes after completing the course

Knowledge

The student has

- attained the requisite knowledge and expertise for challenging jobs in research and development in the field.
- gained knowledge from literature and methods related to the subjects that are part of the master thesis.

Skills

The student is able to

- work independently with a complex problem over a longer period of time.
- analyze a situation, describe a problem and plan its solution.
- master feasible planning that consider alternatives, limitations and time constraints.
- collect and analyze relevant information with an ethically healthy and critical approach.
- present reasearch and results in a clear and comprehensive written thesis.
- communicate knowledge clearly and precisely, orally and in writing.
- express own and others reflections and solutions in the chosen area of research.
- construct models and implement them in digital environments.
- apply methods and design principles to make prototypes for different information systems.

General competence

The student has

- obtained a relation to scientific literature and methods.
- developed academic curiosity
- gained consciousness towards values such as openness, precision and ability to discriminate between knowledge and opinions.
- the ability to think critically about central ethical, philosophical and scientific problems in his/her field.

Content

The content may vary significantly and may include research, development, testing or analysis that will be documented in the master thesis.

Forms of teaching and learning

Guided self-study, writing a master thesis.

Workload

Approx. 1350 hours. Supervision constitutes 40 hours.

Examination

Master thesis and oral exam

The assessment is based on the master thesis (individually or in groups of two people) and an individual oral exam. At the oral examination the candidate first holds a presentation of the master thesis (approx. 30 min). Then the candidate defends his/her thesis (approx 30 min). The oral examination is public.

The thesis is graded on the A - F grading scale. It is given a tentative grade of the thesis. This grade can be adjusted up to 2 stages at the oral exam.

If the student decides to challenge the assessment, the thesis must be re-assessed. If the new assessment affects the tentative grading of the thesis, a new oral exam will be arranged.

Plagiarism control/cheating

Master's theses is subject to electronic plagiarism control. Exam papers that are partly or entirely identical will not be approved and will be regarded as cheating. For further information please see Exam regulations for Østfold University College.

Examiners

The master thesis is assessed by an external examiner in consultation with the supervisor.

Conditions for resit/rescheduled exams

Upon re-examination, both parts of the examination must be retaken.

If the student wishes to improve a passed result of his/her master thesis, the thesis must be rewritten with a new problem statement. In this case, the student is not entitled to receive new academic supervision.

Course evaluation

This course is evaluated by a

- Mid-term evaluation (compulsory)

The responsible for the course compiles a report based on the feedback from the students and his/her own experience with the course. The report is discussed by the study quality committee of the faculty of Computer Sciences.

Literature

Individually chosen, depending on the thesis.

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