Project Semester including Bachelor Thesis Project: Secure, Mobile Systems

Programme course

30 credits

Projekttermin inklusive kandidatprojekt: Säkra, mobila system

TDDD82

Valid from: 2018 Spring semester

Determined by
Board of Studies for Computer Science and Media Technology

Date determined

Main field of study

Information Technology

Course level

First cycle

Advancement level

G2X

Course offered for

- Information Technology, M Sc in Engineering

Entry requirements

Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

Prerequisites

Basic computer science, data structures, computer networks, data bases, mobile networks, mathematical statistics, calculus and linear algebra. Completed courses concerning programming i.e. Object oriented programmint, Data Stuctures and Algorithms, Interaction programming, Computer Hardware and Architecture. Furthermore, students should fulfill the requirements to start a bachelor's thesis project.

For admission to the course, see tab Common rules, headline Commencing a degree project.

Intended learning outcomes

The aim of the course is to teach the content by imitating the situation many engineers are introduced to when they begin their professional careers. As a new employee at a company there is a lot to learn in a short time. Many companies send their employees on intensive courses, where they are expected to learn skills that are necessary in order to work with the company's projects.

As a student you are expected to take on the role of a new employee at a company. You are expected to learn technical-, group- and project aspects that are necessary to function within the company. You are expected to fulfill the technical requirements as well as the professional communication skills necessary to communicate with clients and internal decision makers. During the semester you will work within a project and get practical experience both in project planning and feedback.

You will learn to cooperate with members of your team, clients and experts with a different background than yours. You will see how organizations affect the working groups structure and the individual's ability to act. Furthermore, you will learn to see the wider picture and thereby reflect upon social and ethical aspects.

After a completed course, the student should know how to:

Information security:

- explain and use security terminology and security principles that are presented during the course.
- analyze a situation or an application from an information security standpoint and value fitting mediations that take into consideration risks and threats.
- implement and describe how safe identification and authentication can be implemented in a distributed architecture.
- explain basic cryptographic algorithms and how they are used.

System software:

- understand basic concepts in concurrent programming, such as synchronization, mutual exclusion, semaphores, monitors, and deadlock related problems.
- understand the need for admission control in networks with limited resources, and relate to standard methods to deal with available resources.
- identify and apply methods for fault tolerance in nodes and channels to achieve a predictable level of availability and reliability in communications.
- develop a distributed application that meets requirements on consistency, robustness, and availability.

Software engineering:

- explain the software engineering process and relate it to one's own project.
- explain agile development methods and relate it to one's own project.
- use and demonstrate skills in the development of larger systems on modern mobile platforms such as Android.

Use and integrate knowledge

- show how previously gained knowledge and terminology, techniques and methods within mobile networks integrates with the subjects presented throughout the course.
- demonstrate previously gained knowledge from mathematics and statistics in a larger context.
- assimilate the content of literature and integrate it with one's own work.

Individual and work related skills

- formulate questions and create boundaries within timeframes.
- search and value information from scientific literature and relate to the information in a professional manner and to the current project.

Working in a group

- plan and complete an independently run group project, where decisions are made in relation to relevant scientific, social and ethical aspects.
- describe and use basic group-psychological concepts such as structure, process and development.
- show the contextual dependence for a groups structure and their ability to solve practical problems, specifically with regards to situations that relate to the groups security and risk.
- describe and explain the role of leadership for individuals and groups efficiency, specifically with regards to situations that relate to the groups security and risk.
- experience from discussing with external consultants about different forms of professional support for development of the groups ability to solve internal questions and problems.

Communication

- professional written and oral communication.
- review and discuss an oral and a written independently completed project and report.
- show active participation at presentations.
- communicate how judgment has been used in a project in relation to scientific, social and ethical aspects.

CDIO

- construct an architectural plan for a larger system where considerations are made to economical- (time), social-, ethical-, business-, and corporate conditions.
- create a larger technical system from analyses and evaluations of existing solutions.

- assess a part of a project deeper in an individual and independently run project.
- describe basic normative ethical theories, principals and concepts.
- describe and reflect about social scientific theories regarding risk and communication, specifically in relation to technical development.
- use ethical, group-psychological and social concepts on a specific case.
- use basic normative ethical theories, principles and concepts on social related information technology cases.
- from an ethical perspective reflect about social questions that concern the use of information technology , specifically on questions concerning priority, risk and security.

Course content

Information security: Basic theory regarding information security. Concepts such as risk, threat, confidentiality, integrity and availability. Implementation of cryptographic algorithms for security problems. Identification and authentication. Basic network security. Security in distributed systems.
System software: Concurrent processes, communication, synchronisation and shared resources. Distributed systems with special emphasis on alternative system models, and trade-offs between different requirements like availability, performance, fault tolerance, and security. Dependability terminology, fault modes, and metrics for evaluation of availability and reliable communication during overloads. Methods for management of network resources to satisfy quality of service (QoS) in wired networks.
Software engineering: Basic knowledge regarding software development methods, agile methods and development on modern mobile applications such as Android.
Group-psychology: Basic knowledge regarding the structure and processes of work groups in an organisational context, with focus on risk and security.
Sociotechnological: Basic knowledge of theory regarding social theory of risk, security and communication concerning technical and social development.

Teaching and working methods

The course starts with an intensive set of lectures and individual exams. After this period the group project starts. The examination is done group-wise. A bachelor thesis is completed in pairs, this thesis is a further development of the group-project. The course stretches across the entire semester.

Examination

TEN1	Written examination in information security	U, 3, 4, 5	3 credits

TEN2	Written examination in system software	U, 3, 4, 5	3 credits
TEN3	MTS: Written exam	U, G	3 credits
PRA2	Bachelor assignment with oral and written presentation	U, G	16 credits
PRA3	Project: SW engineering and MTS	U, G	5 credits

Grades

Four-grade scale, LiU, U, 3, 4, 5

Department

Institutionen för datavetenskap

Director of Studies or equivalent

Patrick Lambrix

Examiner

Marcus Bendtsen

Education components

Preliminary scheduled hours: 240 h
Recommended self-study hours: 560 h

Course literature

Se litteraturlista på kursens hemsida.

Common rules

Course syllabus

A syllabus has been established for each course. The syllabus specifies the aim and contents of the course, and the prior knowledge that a student must have in order to be able to benefit from the course.

Timetabling

Courses are timetabled after a decision has been made for this course concerning its assignment to a timetable module. A central timetable is not drawn up for courses with fewer than five participants. Most project courses do not have a central timetable.

Interrupting a course

The vice-chancellor's decision concerning regulations for registration, deregistration and reporting results (Dnr LiU-2015-01241) states that interruptions in study are to be recorded in Ladok. Thus, all students who do not participate in a course for which they have registered must record the interruption, such that the registration on the course can be removed. Deregistration from a course is carried out using a web-based form: www.lith.liu.se/for-studenter/kurskomplettering?l=sv.

Cancelled courses

Courses with few participants (fewer than 10) may be cancelled or organised in a manner that differs from that stated in the course syllabus. The board of studies is to deliberate and decide whether a course is to be cancelled or changed from the course syllabus.

Regulations relating to examinations and examiners

Details are given in a decision in the university's rule book: http://styrdokument.liu.se/Regelsamling/VisaBeslut/622678.

Forms of examination

Examination

Written and oral examinations are held at least three times a year: once immediately after the end of the course, once in August, and once (usually) in one of the re-examination periods. Examinations held at other times are to follow a decision of the board of studies.

Principles for examination scheduling for courses that follow the study periods:

- courses given in VT1 are examined for the first time in March, with re-examination in June and August
- courses given in VT2 are examined for the first time in May, with re-examination in August and October
- courses given in HT1 are examined for the first time in October, with re-examination in January and August
- courses given in HT2 are examined for the first time in January, with re-examination at Easter and in August.

The examination schedule is based on the structure of timetable modules, but there may be deviations from this, mainly in the case of courses that are studied and examined for several programmes and in lower grades (i.e. 1 and 2).

- Examinations for courses that the board of studies has decided are to be held in alternate years are held only three times during the year in which the course is given.
- Examinations for courses that are cancelled or rescheduled such that they are not given in one or several years are held three times during the year that immediately follows the course, with examination scheduling that corresponds to the scheduling that was in force before the course was cancelled or rescheduled.
- If teaching is no longer given for a course, three examination occurrences are held during the immediately subsequent year, while examinations are at the same time held for any replacement course that is given, or alternatively in association with other re-examination opportunities. Furthermore, an examination is held on one further occasion during the next subsequent year, unless the board of studies determines otherwise.
- If a course is given during several periods of the year (for programmes, or on

different occasions for different programmes) the board or boards of studies determine together the scheduling and frequency of re-examination occasions.

Registration for examination

In order to take an examination, a student must register in advance at the Student Portal during the registration period, which opens 30 days before the date of the examination and closes 10 days before it. Candidates are informed of the location of the examination by email, four days in advance. Students who have not registered for an examination run the risk of being refused admittance to the examination, if space is not available.

Symbols used in the examination registration system:

** denotes that the examination is being given for the penultimate time.

* denotes that the examination is being given for the last time.

Code of conduct for students during examinations

Details are given in a decision in the university's rule book:
http://styrdokument.liu.se/Regelsamling/VisaBeslut/622682.

Retakes for higher grade

Students at the Institute of Technology at LiU have the right to retake written examinations and computer-based examinations in an attempt to achieve a higher grade. This is valid for all examination components with code "TEN" and "DAT". The same right may not be exercised for other examination components, unless otherwise specified in the course syllabus.

Retakes of other forms of examination

Regulations concerning retakes of other forms of examination than written examinations and computer-based examinations are given in the LiU regulations for examinations and examiners,
http://styrdokument.liu.se/Regelsamling/VisaBeslut/622678.

Plagiarism

For examinations that involve the writing of reports, in cases in which it can be assumed that the student has had access to other sources (such as during project work, writing essays, etc.), the material submitted must be prepared in accordance with principles for acceptable practice when referring to sources (references or quotations for which the source is specified) when the text, images, ideas, data, etc. of other people are used. It is also to be made clear whether the author has reused his or her own text, images, ideas, data, etc. from previous examinations.

A failure to specify such sources may be regarded as attempted deception during examination.

Attempts to cheat

In the event of a suspected attempt by a student to cheat during an examination, or when study performance is to be assessed as specified in Chapter 10 of the Higher Education Ordinance, the examiner is to report this to the disciplinary board of the university. Possible consequences for the student are suspension from study and a formal warning. More information is available at https://www.student.liu.se/studenttjanster/lagar-regler-rattigheter?l=sv.

Grades

The grades that are preferably to be used are Fail (U), Pass (3), Pass not without distinction (4) and Pass with distinction (5). Courses under the auspices of the faculty board of the Faculty of Science and Engineering (Institute of Technology) are to be given special attention in this regard.

1. Grades U, 3, 4, 5 are to be awarded for courses that have written examinations.
2. Grades Fail (U) and Pass (G) may be awarded for courses with a large degree of practical components such as laboratory work, project work and group work.

Examination components

1. Grades U, 3, 4, 5 are to be awarded for written examinations (TEN).
2. Grades Fail (U) and Pass (G) are to be used for undergraduate projects and other independent work.
3. Examination components for which the grades Fail (U) and Pass (G) may be awarded are laboratory work (LAB), project work (PRA), preparatory

written examination (KTR), oral examination (MUN), computer-based examination (DAT), home assignment (HEM), and assignment (UPG).
4. Students receive grades either Fail (U) or Pass (G) for other examination components in which the examination criteria are satisfied principally through active attendance such as other examination (ANN), tutorial group (BAS) or examination item (MOM).

The examination results for a student are reported at the relevant department.

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at http://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.

Degree projects (included in Term 6 of study programmes in engineering)

General provisions

All study programmes in engineering (with the exception of the programme in Industrial Engineering and Management – International and the programme in Applied Physics and Electrical Engineering – International) have since 2014 included an obligatory degree project. The project undertaken may also be included as part of the Bachelor of Science (Technology). During Term 6 of each programme, one or several special courses are given that constitute degree projects. The syllabuses of these courses contain course-specific provisions, which are supplemented with the general provisions given below.

Aim

The degree project is to contribute to general and programme-specific objectives of

the study programmes in engineering being achieved. Specific learning outcomes are given in the relevant course syllabus. In addition, the degree project has also the following learning outcomes, which are common to all degree project-based courses at LiTH:

- Knowledge of the subject
  After carrying out the degree project, the student is expected to master the following:
  - integrating in a systematic manner the knowledge gained during the period of study
  - applying methodological knowledge and subject-specific knowledge within the main subject area
  - assimilating the contents of relevant technical publications and relating the study to such contents.
- Personal and professional skills
  After carrying out the degree project, the student is expected to possess the following skills:
  - formulating research questions and limiting the same, within a specified time schedule
  - seeking and evaluating scientific literature.
- Working and communicating in a group
  After carrying out the degree project, the student is expected to possess the following skills:
  - planning, executing and presenting independent work in the form of a project carried out in a group
  - expressing oneself professionally, in writing and orally
  - critically examining and discussing independent work presented in speech and in writing.
- CDIO engineering fundamentals
  After carrying out the degree project, the student is expected to master the following:
  - creating, analysing and/or evaluating technical solutions
  - making assessments that consider relevant scientific, societal and ethical aspects.

Degree projects undertaken while studying abroad

During study abroad, an individual plan is to be drawn up together with the faculty programme director to determine how the requirements for a degree project in

engineering can be satisfied.

Commencing a degree project

Before a student commences a degree project, the following requirements must be satisfied:

- The student must have a minimum of 90 credits obtained from courses from Terms 1-4 of the programme (courses taken voluntarily are not counted). This requirement must be satisfied before the end of the third week of study period 2 of the autumn term before the degree project is to be carried out.
- The student must have completed the subject-specific courses listed in the course syllabus for the relevant degree project course. This requirement must be satisfied before the end of the third week of study period 2 of the autumn term before the degree project is to be carried out.
- When assessing whether the requirements have been satisfied, individual decisions (such as those taken in association with admission to subsequent parts of the programme) are to be considered.

Registration for a degree project is carried out during the course registration period 1-10 October in the autumn before the degree project is to be undertaken. Registration is to be made using a special web-based form: www.lith.liu.se/for-studenter/anmalan-till-kandidatprojekt?l=sv.

Forms of examination

The examiner for the degree project is responsible for ensuring that examination takes place as specified by the course syllabus, and, where appropriate, carries out the duties of an examiner for degree projects.

The written report of the degree project corresponds to a degree project for a bachelor's degree. This means that it is to be managed in an equivalent manner with respect to publication, unless special circumstances apply.

The report must be prepared in accordance with principles for acceptable practice when referring to sources (references or quotations for which the source is specified) when the text, images, ideas, data, etc., of other people are used. It is also to be made clear whether the author has reused his or her own text, images, ideas, data, etc. from previous examinations, such as undergraduate work, project reports, etc. (This is sometimes known as “self-plagiarism”.) A failure to specify such sources may

be regarded as attempted deception during examination.

In cases in which several students carry out a degree project together, the contribution of each student is to be specified. The extent of the work for each student is to correspond to that of a degree project. The examiner is to ensure that each student has contributed in a satisfactory manner to the work, and that each student satisfies the requirements for achieving a Pass grade for the degree project.