Project Course CDIO

Programme course

12 credits

Projektkurs, CDIO

TNE085

Valid from: 2018 Spring semester

Determined by
Board of Studies for Electrical Engineering, Physics and Mathematics

Date determined

Offered for the last time
Autumn semester 2025

Replaced by
TNE110

Main field of study
Electrical Engineering

Course level
Second cycle

Advancement level
A1F

Course offered for
- Electronics Design Engineering, M Sc in Engineering

Specific information
Exchange students may apply for the course after arrival to LiTH but before it starts. The Faculty coordinators for exchange studies must be contacted before applying.

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
Analog electronics, digital electronics, circuit theory, micro-computers, signals and systems, mobile communications, wireless systems and networks, basic knowledge in printed circuit board manufacturing, basic programming skills. Knowledge and skills to carry out a project under a design model such as LIPS.

Intended learning outcomes
The purpose of this course is that students should work with a major project, from feasibility studies to finished prototype. The "CDIO syllabus" serves as governing policy on the learning goals.

The student selects a project within electronics design or data/telecommunication, applying previously acquired knowledge, and acquires new knowledge when necessary to conduct the project. The project work should be conducted in a professional manner, and student should develop and consolidate skills according to "CDIO Syllabus", by:

- Applying knowledge and methods from previous courses, especially analog and digital electronics, microcomputers, programming, wireless

communication systems, mobile communications and networks etc.
- Acquiring new knowledge when necessary.
- Combining knowledge from different disciplines, such as communication electronics, power electronics, microcomputers, programming, wireless communication systems and networks etc. and applying them in new contexts.
- Formulating a set of requirements for the project based on a project charter, and thereby assess the project's feasibility in terms of technology and available resources
- Presenting the project results both for the client and also for other students, who cannot be presumed to be specialists in the technical areas covered by the project.
- Demonstrating the ability to independently manage project work with the support of a project model and with limited resources in terms of personnel, equipment and time.
- Planning, implementing and monitoring a project.
- Analyzing and structuring problems, and analyzing and drawing conclusions from the results.
- Taking the initiative in finding creative solutions.
- Actively contributing to the project to run smoothly through good team work and social skills.

The results of the project should:
- Hold high technical quality and must be based on up-to-date knowledge and methods in electronic design or communication systems/networks.
- Be documented in the form of project plan and project timetable, and in the form of a technical report.
- Be presented orally and in the form of a demonstration of a prototype (design).
- Be of such good quality (in terms of documents and construction wise) that can be followed by future students.

The course aims also that students assimilate knowledge and entrepreneurial skills, with an emphasis on business planning for new activities. After the course the student should also:

- Be able describing requirements for new enterprises.
- Be able describing the information and analysis needed to evaluate a development project from a commercial perspective, and have the ability to collect and analyze relevant information for this purpose.

Course content

The projects will be closely linked to the ED- or WNE-program profiles: communications electronics, solar cells and printed electronics, wireless networks, or to companies operating in these areas. Projects can vary from year to year. Here are some examples of possible projects.

Within Power electronics (solar cell application): Automatic power control unit for recycling of the braking energy in the form of re-charging the battery in electric vehicles, Current, voltage control units in electric cars, power inverters, etc.

Within Printed electronics: Develop an organic display, design and develop control unit for an organic display by using conventional electronics, control device for smart windows, window glass is more or less transparent depending on the light intensity of outdoor / indoor ...

Within communication electronics: radio front, Developing a transmitter / receiver module according to IEEE 80215.4 standard, design, manufacturing and configuration of a Zigbee module.

Within wireless networks: Design, implementation, verification and validation of simulation models for analyzing various communication networks.

Within the smart homes: Climate Control Indoor, fire / burglary alarm with web monitoring, automated vacuum cleaning, operation of home care services via mobile phone (light, heat, garage door ...).

Teaching and working methods

The course consists of a few introductory lectures, the rest is self-study. Each project team, composed of 5-8 students (depending on the total number of students in the course, will be assigned a mentor who supports the group in its work. There is also a limited access to technical experts.

For each project there is a client, with whom the project team negotiates the terms, conditions and specifications.

Before the project work begins the team should prepare a project timetable. Projects must be conducted according to the LIPS model. Requirements, specifications, milestones and timetable and other project documents should follow the templates that are included in LIPS.

The course runs over the entire autumn semester.

Examination

UPG1	Assignments on entrepreneurship, report	3 credits	U, G
PRA1	Project	9 credits	U, G

The project work will be examined against the learning goals mentioned in the CDIO Syllabus. Especially the following aspects of the project will be examined.

- The quality of all supplied documents (according to the LIPS project model).
- The quality of the oral presentation and the subsequent (public) demonstration.
- The quality of the technical approach / design. To pass the project, all the above parts are to be approved. In addition, a report on entrepreneurship to be accepted and approved.

Grades

Two grade scale, older version, U, G

Department

Institutionen för teknik och naturvetenskap

Director of Studies or equivalent

Adriana Serban

Examiner

Ole Pedersen

Course website and other links

http://www2.itn.liu.se/utbildning/kurs/

Education components

Preliminary scheduled hours: 34 h
Recommended self-study hours: 286 h

Course literature

Compendia

Other

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.