



Programme syllabus

Faculty Board of Science and Engineering
School of Engineering

Byggteknik, magisterprogram, 60 högskolepoäng
Structural Engineering, Master Programme, 60 credits

Level

Second Level

Establishment of Programme

Established by Organisational Committee 2009-03-26

Date of Ratification

Approved by 2010-11-08

The programme syllabus is valid from autumn semester 2011

Prerequisites

General entry requirements for second-cycle studies and specific entry requirements:

- Bachelor of Science degree in Civil Engineering, Architectural Engineering or the equivalent. This degree must include a minimum of 7.5 credits in Structural Mechanics or Mechanics of Materials as well as mathematics corresponding to the courses Calculus 1 (7.5 credits) and Vector geometry/Linear algebra (7.5 credits) or the equivalent.
- English B/6 or the equivalent.

Description of Programme

The programme provides an extension of in-depth knowledge within structural engineering and prepares the student for work in industry within the field of structural engineering as well as for research studies at doctoral level.

The programme aims to train qualified engineers within structural engineering with a specialism in computational mechanics and timber engineering.

Objectives

Knowledge and understanding

For a Degree of Master (One Year) students must

- demonstrate knowledge and understanding in their main field of study, including both a broad command of the field and deeper knowledge of certain parts of the field, together with insight into current research and development work; and
- demonstrate deeper methodological knowledge in their main field of study.

Skills and abilities

For a Degree of Master (One Year) students must

- demonstrate an ability to integrate knowledge and to analyse, assess and deal with complex phenomena, issues and situations, even when limited information is available;
- demonstrate an ability to independently identify and formulate issues and to plan and, using appropriate methods, carry out advanced tasks within specified time limits;
- demonstrate an ability to clearly present and discuss their conclusions and the knowledge and arguments behind them, in dialogue with different groups, orally and in writing; and
- demonstrate the skill required to participate in research and development work or to work in other advanced contexts.

Judgement and approach

For a Degree of Master (One Year) students must

- demonstrate an ability to make assessments in their main field of study, taking into account relevant scientific, social and ethical aspects, and demonstrate an awareness of ethical aspects of research and development work;
- demonstrate insight into the potential and limitations of science, its role in society and people's responsibility for how it is used; and
- demonstrate an ability to identify their need of further knowledge and to take responsibility for developing their knowledge.

Programme-specific objectives

Knowledge and understanding

For the Degree of Master (One Year) students must:

- demonstrate general knowledge and understanding of the field of civil/structural engineering and
- demonstrate an in-depth extension of knowledge regarding structural mechanics analysis, structural design and timber engineering technology.

Skills and ability

For a Degree of Master (One Year) students must

- demonstrate an ability to analyse and mathematically model engineering problems in a constructive manner, with particular relevance to the wood construction technology field,
- demonstrate an ability to analyse and design advanced timber constructions,
- demonstrate an ability to utilise modern analysis tools and computer software within calculation mechanics (finite element method),
- demonstrate an ability to specify development projects and assess different technical solutions early on in a development process,
- demonstrate an ability to plan and conduct independent projects within fields that require the above mentioned skills,
- demonstrate an ability to communicate technical problems with the help of computer aids and different types of software, and
- demonstrate an ability, through written reports and verbal presentations, to professionally present problems, analyses and results.

Judgement and approach

For the Degree of Master (One Year) students must

- demonstrate an ability to make engineering assessments, i.e. assess relevance, applicability and thoroughness in analyses and calculations with consideration to relevant assumptions and simplifications, and
- demonstrate an ability to identify needs for additional knowledge in and in connection with the field of civil/structural engineering, take responsibility for the personal knowledge development.

Content

Organization

This programme is offered by the Department of Civil Engineering at the School of Engineering. A programme director at the department will have a special responsibility for the administration of the programme. Through active participation in courses and a degree dissertation project within the subject area, students will be offered prerequisites for meeting the expected learning outcomes presented in the previous section. The knowledge and skills acquired by the student will also form the basis for both qualified work within the industry and research assignments within academy. The organisation of the programme is listed below in terms of individual courses. These are further described in the following section.

For the purposes of administering the programme, a programme council is established. The programme council consists of lecturing staff, students and industry representatives. The council has regular meetings for discussing programme contents and routines as well as acting as an interface with industry representatives.

Programme overview

During the first semester the programme consists of courses within mathematics, computational mechanics and timber engineering. The second term consists of courses in structural dynamics in addition to scientific methodology and planning, as well as a degree project.

Programme courses

The programme contains the following courses

Term 1:

Multivariable analysis and vector calculus (7.5 higher education credits, Mathematics, basic level, extension G1F). This course includes central concepts and theories in multi-variable analysis and linear algebra in accordance with the programme courses and the general objective for the programme.

Analysis of structures (7.5 higher education credits, Civil engineering*, advanced level, extension A1N). This course mainly includes element-based, matrix-formulated displacement methods that enable estimations to be made of deformations and section forces in combined structures of beams and bars. This course also includes studies of various mechanical behaviours and the modelling of structures.

The finite element method (7.5 higher education credits, Civil engineering, advanced level, extension A1N). This course is based on advanced structure mechanics. The theoretical background of the finite element method and its implementation in various problems is presented. The focus is primarily put on conduction of heat- and elasticity problems.

Timber-based building systems (7.5 higher education credits, Civil engineering*, advanced level, extension A1N). This course includes wood based building systems, components and material and addresses various design problems that are specific to wooden constructions. This course offers training in critical analysis of the function of wood based building systems.

Term 2:

Structural dynamics (7.5 higher education credits, Structural Engineering*, second level, A1N). Structural dynamics is an area with a wide range of applications spanning from aerospace, vehicle and machine to buildings. Within this area structures' dynamic behavior are studied; this includes performance, comfort, life and vibrations when time varying loads due to human beings, maneuvers, wind, earth quakes etc. are applied to the structure. Within Structural Dynamics more often than not finite element models are used to calculate structural responses.

Scientific methodology and planning (7.5 higher education credits, Civil engineering*, advanced level, extension A1N). This course addresses methods and offers practical guidance in defining objectives, limitations and execution of a project in research and industry. This course offers training in the ability to present results verbally and in written technical reports. This course also includes scientific theory, research methodology and performing literature searches.

Degree project (15 higher education credits, Civil engineering*, advanced level, extension A1E). This course concludes the programme and offers students possibilities to put into practice their experience in the form of an independent project. Students are to demonstrate their ability to implement knowledge acquired throughout the programme, defining a problem, conducting a survey, in addition to analysing and presenting the results.

* main field cours

Work experience and community contacts

This programme offers possibilities for students to establish contacts with industry- and research groups through the teachers and lecturers who work within the industry or research, field trips and the planning of a degree dissertation project work in conjunction with industry.

Issues concerning working life are also discussed at the Programme Board.

Studies abroad

Any studies abroad must be planned in consultation with the international coordinator at the department and with the lecturer responsible for the programme.

Perspectives in Education

The following perspectives were integrated in the program:

Sustainable Development

Using wood as a renewable material contributes to sustainable development. Through the program's focus on the use of wood as a construction material is a natural gateway to sustainability in education.

Gender

Gender perspective on education and the professional role as the program prepares discussed in connection with the Programme Board. Of course, all students, regardless of gender equal in the program when it comes to teaching, tutoring and more.

Diversity

Diversity perspective on education and the professional role as the program prepares discussed in connection with the Programme Board. Of course, all students, regardless of ethnic origin, etc. equal in the program when it comes to teaching, tutoring and more.

Internationalization

A step in the internationalization has been to change the language from Swedish to English and the program will meet students from many different countries and continents. To create cooperation with foreign universities for student and teacher exchange is a future goal of the program.

Quality Development

This programme is continuously evaluated after each course by the students through evaluation forms and summaries. The lecturer responsible for the course is also responsible for making sure that evaluations are carried out. At the end of each term the programme is evaluated by student representatives and programme teachers. The course- and programme evaluations are followed up by the Board of Undergraduate Education and the Head of School. Summaries of course- and programme evaluations are archived at the School.

The programme is assessed and compared with equivalent programmes at other universities and universities colleges by the National Agency for Higher Education in Sweden. Certain examinations and guarantees of quality are also conducted together with industry representatives, especially since many students carry out their degree projects in industry.

Degree Certificate

After completing programme studies, corresponding to the requirements expressed in the Higher Education Ordinance degree order as well as Linnaeus University degree order, the student may apply for a degree. Those who have completed the programme may obtain the following degree::

Teknologie magisterexamen
Huvudområde: Byggt teknik

Master of Science (60 credits)

Main field of study: Civil Engineering.

The degree certificate is bilingual (Swedish/English). This certificate is also completed with a Diploma Supplement (in English).