

National Curriculum Regulations for Engineering Education

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National Curriculum Regulations for Engineering Education

Legal authority: Laid down by the Ministry of Education and Research on 3 February 2011, with legal authority in section 3-2, second paragraph, of Act no. 15 of 1 April 2005 relating to universities and university colleges.

Section 1. *Scope and purpose*

The Regulations apply to universities and university colleges that provide engineering education and that are accredited in accordance with sections 1-2 and 3-1 of the Act relating to universities and university colleges.

The Regulations apply to the 3-year bachelor's degree in engineering subjects. The Regulations define the national framework for engineering education.

The purpose of the Regulations is to ensure that the higher education institutions provide a professionally oriented, integrated and research-based engineering education of high academic quality. The Regulations are to ensure that Norwegian engineering education is nationally and internationally acclaimed as a qualitatively good programme of technical, professional education in the first cycle of higher education. They are to ensure that the study programmes follow the standards and criteria that apply to engineering education, and satisfy society's current and future demands to engineers. They are to ensure that the study programmes have an international perspective and that the candidates are able to function in an international working environment.

The Regulations are to ensure that the institutions facilitate an integrated engineering education with coherence and cohesion between subjects, courses, theory and practical training as well as teaching methods and assessments of the students. Technological, scientific and social science topics are to be integrated and considered in context. The education is to facilitate and safeguard the interaction between ethics, environment, technology, individual and society.

Section 2. Learning outcomes

The wording of the learning outcomes descriptors is based on the approved Norwegian Qualifications Framework (NQF).

A candidate with a completed and passed 3-year bachelor's degree in engineering shall have achieved the following total learning outcomes defined in terms of knowledge, skills and general competence:

Knowledge

The candidate has broad knowledge that provides an integrated systems perspective on engineering in general, with specialisation in his/her own engineering subject.

The candidate has basic knowledge in mathematics, natural sciences and relevant social and economic subjects and about how these may be integrated in the resolution of engineering problems.

The candidate has knowledge of the history of technology, the development of technology, the engineer's role in society as well as the consequences of the development and use of technology.

The candidate is familiar with research and development work in his/her own field, as well as relevant methods and ways of working in engineering.

The candidate is able to update his/her knowledge of the field, both by gathering information and through contact with professional communities and the practical field.

Skills

The candidate can apply knowledge and relevant results of research and develop work to solve theoretical, technical and practical problems in engineering and be able to give reasons for his/her choices.

The candidate is digitally literate in engineering subjects, is able to work in relevant laboratories and masters methods and tools as a basis for goal-oriented and innovative work.

The candidate is able to identify, plan and carry out engineering projects, tasks, trials and experiments both independently and in teams.

The candidate is able to find, evaluate, use and refer to information and professional subject matter and present it in a manner that sheds light on a problem.

The candidate can contribute to new thinking, innovation and entrepreneurship by his/her participation in developing and realising sustainable and socially useful products, systems and/or solutions.

General competences

The candidate has insight into environmental, health-related, social and financial consequences of products and solutions in his/her field, and is able to put these into an ethical perspective and a life cycle perspective.

The candidate is able to communicate knowledge of engineering to different target groups, both in writing and orally in Norwegian and English, and is able to contribute to making the significance and consequences of technology visible.

The candidate is able to reflect on his/her own professional practice, also in teams and an inter-disciplinary context, and is able to adjust this to the relevant working situation.

The candidate is able to contribute to the development of good practice by taking part in academic discussions in the subject area and share his/her knowledge and experiences with others.

Section 3. Structure and content

In order to achieve a bachelor's degree in engineering, the candidate must have passed at least 180 credits consisting of the following course groups:

- 30 credits *common courses* consisting of basic mathematics, engineering systems thinking and introduction to engineering vocational practice and working methods. The common courses are shared by all study programmes.
- 50 credits *programme courses* consisting of technical subjects, natural sciences and social sciences. Programme courses are shared by all programme options in a study programme.
- 70 credits *technical specialisation courses* that provide a clear direction in his/her own engineering subject and build on programme courses and common courses.
- 30 credits *elective courses* that contribute to academic specialisation, either in breadth or depth.

A course must have a scope of at least 10 credits.

A bachelor's thesis is compulsory for all candidates and must be a part of courses of technical specialisation with 20 credits. The thesis must be rooted in real problems from society and business life or research and development work, and contribute to an introduction to scientific theory and methods.

The institutions shall make it possible for the students to have an international semester and an international perspective in their education.

The study programmes must have close contact with relevant business and working life. The study programmes shall use laboratory work and practical training to show how technology may be applied and complement the theoretical part of the education. Practical training that awards credits and is relevant to the student's technical specialisation, may make up part of elective courses or be part of his/her courses of technical specialisation with up to 10 credits.

Study model Y-path

Institutions wishing to offer engineering education to applicants with relevant vocational certificates (Y-path), cf. section 3-3 of the Regulations concerning Admission to Higher Education, must design a specially adapted path within the programme option for students with this admission background. This path shall be constructed so that the candidates admitted via the Y-path achieve the same learning outcomes as the other candidates.

Section 4. National guidelines, indicators and programme plan

National guidelines for course groups and individual courses in engineering education and indicators for the characteristics of engineering education of high international quality will be prepared.

Within the given national framework, the individual institution determines programme descriptions for engineering education with stipulations about programme options and

academic content, expressed as requirements as to learning outcome at study programme, programme option and course level. The programme descriptions shall also contain decisions about organisation, teaching methods and assessment schemes.

The programme description is to facilitate academic collaboration between institutions and national and international mobility. The institutions must be in close contact with relevant working and business life when preparing the programme description. As far as it is academically defensible and possible, the programme description should make flexible study paths feasible. The programme description is to be approved by the institution's Board.

Section 5. *Exemption provisions*

Exemption may be granted for a maximum of 60 credits for relevant 2-year tertiary vocational education in technical subjects. It is a prerequisite that the tertiary vocational education meets the requirements for admission to engineering education. Exemption may not be granted for common courses.

For relevant vocational certificate and practical experience (Y-path), cf. section 3, exemption may be granted for a maximum of 30 credits. Exemption based on previous competences shall be adapted into the elective courses groups (up to 20 credits) and technical specialisation courses (up to 20 credits).

Exemption shall be entered on the diploma.

Section 6. *Entry into force and transitional provisions*

The Regulations enter into force on 1 January 2012. The Regulations apply to students admitted as of admission to the academic year of 2012–2013. For students at institutions that on application may start engineering education in accordance with this National Curriculum from the academic year of 2011–2012, the Regulations enter into force immediately.

Students following the previous National Curriculum have the right to sit examinations in accordance with this until 31 December 2017. From this point in time, the National Curriculum Regulations for Engineering Education of 1 December 2005 no. 1372 are repealed.
