

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 recognised 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 relating to engineers. They are to ensure that the study programmes have an international perspective and that the graduates 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.

Enters into force 1 August 2018.

Section 2. *Learning outcomes*

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

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

Knowledge

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

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

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

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

Skills

The graduate can apply knowledge and relevant results of research and development to solve theoretical, technical and practical problems in engineering and explain his/her choices.

The graduate has knowledge about relevant software and possesses broad engineering-related digital competence, including basic programming skills.

The graduate is able to work in relevant physical and digital laboratories and masters methods and tools as a basis for goal-oriented and innovative work.

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

The graduate 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 graduate is able to contribute to new thinking, innovation and entrepreneurship by his/her participation in developing and realising sustainable, socially beneficial products, systems and/or solutions.

General competence

The graduate 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 graduate can identify aspects relating to security, vulnerability, data protection and information security in products and systems that use ICT.

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

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

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

Enters into force 1 August 2018.

Section 3. *Structure and content*

To obtain a bachelor's degree in engineering, the candidate must have earned at least 180 credits consisting of the following:

– Engineering basis: 30 credits of basic mathematics, engineering systems thinking and introduction to engineering occupational practice and working methods. These shall principally relate to the engineering education and lay a foundation for the engineering programme.

– Programme basis: 50–70 credits in technical subjects, natural sciences and mathematics and social sciences. These shall principally relate to the study programme and lay a foundation for the field of study.

– Technical specialisation: 50–70 credits that provide clear direction within the student's own field of study and build on the engineering basis and programme basis. These shall principally relate to the programme option and lay a foundation for the subject area.

– Elective subjects: 20-30 credits that contribute to academic specialisation, either in scope or in depth.

A course size must be at least 5 credits, and the number of credits must be divisible by 2.5.

A bachelor's thesis is compulsory for all candidates and is to comprise a minimum of 20 credits of the technical specialisation. The thesis must reflect real problems from society and the business sector or research and development activity, and contribute to an introduction to scientific theory and methods.

The institutions shall facilitate a study semester abroad and incorporate an international perspective in their study programme.

The study programmes must have close contact with relevant business activity and working life. The study programmes shall use laboratory work and practical training to show how technology may be applied and to supplement the theoretical part of the education. Practical training that awards credits and is relevant to the student's technical specialisation may count towards the elective subjects requirement or, to a maximum of 10 credits, technical specialisation.

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.

Enters into force 1 August 2018.

Section 4. *National guidelines, indicators and programme description*

National guidelines for course groups and individual courses in engineering education and indicators for high international quality engineering education will be established.

Within the given national framework, the individual institution determines programme descriptions for engineering education, with stipulations about programme options and academic content, articulated through requirements for learning outcomes at study programme, programme option and course level. The programme descriptions shall also contain provisions regarding organisation, teaching methods and assessment schemes.

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

Enters into force 1 August 2018.

Section 5. *Exemption provisions*

An 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.

For relevant vocational certificate and practical experience (Y-path), cf. section 3, an exemption may be granted for a maximum of 30 credits.

Any exemption must be stated on the diploma.

Enters into force 1 August 2018.

Section 6. *Entry into force and transitional rules*

The Regulations enter into force on 1 August 2018. The Regulations apply to students admitted as of the academic year of 2019–2020. The institutions may decide that these Regulations shall apply to students admitted as of the academic year of 2018–2019. The institutions may also determine that parts of the Regulations shall apply to students for whom the previous National Curriculum Regulations were applicable.

Students following the previous National Curriculum Regulations have the right to sit examinations in accordance with these until 31 December 2023. From this point in time, the National Curriculum Regulations for Engineering Education of 3 February 2011 no. 107 are repealed.