STANDARDS AND PROCEDURES FOR ENGINEERING PROGRAMME ACCREDITATION
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1 Accreditation framework and objectives

1.1 Background and objectives

The Finnish Education Evaluation Centre FINEEC’s Engineering Programme Accreditation aims to support the enhancement of quality in engineering degree programmes. The accreditation is voluntary for Finnish higher education institutions and degree programmes, and the operating status or degree awarding power of a degree programme does not depend on an accreditation by FINEEC. The Engineering Programme Accreditation method responds to a demand for evaluations which support the assurance and enhancement of quality of teaching and learning at the programme level.

The accreditation provides higher education institutions with the means to get an independent evaluation of how a degree programme provides its graduates with the academic qualifications necessary for a career in the engineering profession. Additionally, the accreditation aims to facilitate professional recognition of engineering degrees internationally. Higher education institutions can also use the accreditation standards as a tool in the evaluation and development of their programmes.

The standards and procedures of the accreditation are based on the European Accredited Engineer (EUR-ACE) framework standards\(^1\) of the European Network for Accreditation of Engineering Education (ENAAE).

An accreditation evaluates a degree programme – organisation, planning, implementation and development – to decide if the programme’s operation ensures that its students achieve the programme’s learning outcomes; and to decide if the programme’s learning outcomes correspond to the FINEEC reference programme learning outcomes (see Section 3).

\(^1\) http://www.enaee.eu/publications/european-framework-standards
The FINEEC reference programme learning outcomes describe the knowledge, skills and competences that the learning process should enable Bachelor’s or Master’s degree graduates to demonstrate. The reference programme learning outcomes are common for all branches of engineering to enable accreditations to reflect on the specific demands of different branches and to embrace the growing diversity of engineering programmes.

An accreditation process can result in one of three different outcomes:

- The programme is accredited without reservation and the accreditation is valid for six years;
- The programme is conditionally accredited, and the accreditation is valid for six years only if the conditions are met within a specified amount of time;
- The programme is not accredited.

Chapters 2–7 describe the standards and procedures for accreditation in full detail.

1.2 On the EUR–ACE system

The EUR–ACE Label is a certificate that authorised quality assurance agencies can award to engineering degree programmes. The European Network for Accreditation of Engineering Education (ENAEE) is responsible for the EUR–ACE Framework Standards and Guidelines. ENAEE authorises quality assurance agencies that fulfil the standards to award the EUR–ACE Label.

The goal of the ENAEE is to promote the mobility of graduates from degree programmes in engineering through mutual recognition of the accreditation decisions issued by a European accreditation association.

According to the ENAEE, the principal aim of the EUR–ACE project is to develop a framework for the accreditation of engineering degree programmes within the European Higher Education Area. ENAEE has developed the framework standards and the procedures for their implementation to be widely applicable and inclusive to reflect the diversity of the engineering degree programmes. The framework affords a means for comparing educational qualifications within the EHEA and promotes the mobility of engineering graduates. The EUR–ACE Label may be awarded to Bachelor’s (First Cycle) and Master’s (Second Cycle) degrees in engineering.

The engineering degree programmes that have been awarded the EUR–ACE Label and the agencies authorised to award the EUR–ACE Label, are listed on the ENAEE website2.

2 http://www.enaee.eu/
1.3 Eligible programmes

FINEEC is currently authorised to award the EUR–ACE Bachelor Label to four–year (240 ECTS) Bachelor’s programmes. Pilot accreditations are possible for 180 ECTS Bachelor's degree and 60–120 ECTS Master’s degree programmes in Engineering or Technology and can also lead to the EUR–ACE Label.

Programmes that seek to be accredited should be informed of the accreditation standards (see Section 2) and reasonably confident that the programme's learning outcomes correspond to the FINEEC reference programme learning outcomes (see Section 3).
Accreditation standards

An accredited programme fulfils the following standards for planning of education, implementation of education, resources and quality management.

Planning of the programme

1) The programme aims, which describe the educational task and purpose of the programme, are consistent with the mission of the higher education institution and reflect the identified needs of employers and other stakeholders.

2) The programme learning outcomes, which describe the knowledge, understanding, skills and abilities that the programme enables graduates to demonstrate, are consistent with the programme aims, with relevant national qualifications frameworks (if applicable) and with the FINEEC reference programme learning outcomes (see Section 3).

3) The course level learning outcomes, including thesis work and possible practical training, aggregate to the programme’s learning outcomes.

4) The curriculum gives comprehensive information on all the individual courses of the programme, including thesis work and possible practical training, and is accessible to students.

5) The curriculum and the course timetable enable students to graduate in the expected time.

6) The criteria and process for student admission and transfer are clearly specified and published. Students should be informed of the qualifications necessary to enter the programme.

7) Students are informed of regulations and guidelines that concern recognition of prior learning, progress of studies and graduation.
Implementation of teaching and learning

8) The teaching and learning process, including the assessment of students, enables students to demonstrate that they have achieved the intended course and programme level learning outcomes. Students have an active role in co-creating the learning process and the assessment of students reflects this approach.

Resources

9) The academic staff are sufficient in number and qualification to enable students to achieve the programme learning outcomes. There are arrangements in place to keep the pedagogical and professional competence of the academic staff up to date.
10) An effective team of technical and administrative staff supports the programme. There are arrangements in place to keep the competence of the support staff up to date.
11) The students are provided adequate and accessible support services to enable the achievement of the programme learning outcomes.
12) The classrooms, computing facilities, software, laboratories, workshops, libraries and associated equipment and services are sufficient and accessible to enable students to achieve the programme learning outcomes.
13) The HEI and the programme have external partnerships that are adequate to the achievement of the programme learning outcomes.
14) The financial resources are sufficient to implement the learning process as planned and to further develop it.

Quality management

15) The quality management procedures of the programme are consistent with the quality policy of the higher education institution.
16) The organisation and decision-making processes of the programme are fit for effective management.
17) The programme reviews and develops the programme aims, curriculum, teaching and learning process, resources and partnerships and quality management in a systematic and regular manner, taking into account analysis of results of student admissions, students’ study progress, achieved learning levels, student, graduate and employer feedback and graduate's employment data.
18) The programme provides public, up to date information about its objectives, teaching and learning process, resources, quality management procedures and results.
FINEEC reference programme learning outcomes describe the knowledge, skills and competencies that the learning process should enable Bachelor's or Master's degree engineering graduates to demonstrate.

3.1 Bachelor's degree

Knowledge and understanding

The learning process should enable Bachelor Degree graduates to demonstrate:

- knowledge and understanding of mathematics and other basic sciences underlying their engineering specialisation, at a level necessary to achieve the other programme learning outcomes;
- knowledge and understanding of engineering disciplines underlying their specialisation, at a level necessary to achieve the other programme learning outcomes, including some awareness at the forefront;
- knowledge and understanding of applicable materials, equipment and tools, engineering technologies and processes, and of their limitations, in their specialisation;
- knowledge and understanding of applicable techniques and methods of analysis, design and investigation, and of their limitations, in their specialisation;
Engineering practice

The learning process should enable Bachelor Degree graduates to demonstrate:

- ability to analyse complex engineering products, processes and systems, and to correctly interpret the outcomes of such analyses, by being able to select and having the practical skills to apply relevant established analytical, computational and experimental techniques and methods
- ability to identify, formulate and solve complex engineering problems, by being able to select and having the practical skills to apply relevant established analytical, computational and experimental techniques and methods
- ability to develop and design complex products (devices, artefacts, etc.), processes and systems to meet established requirements that can include societal, health and safety, environmental, economic and industrial constraints, by being able to select and having the practical skills to apply relevant design methodologies
- practical skills for realising complex engineering designs
- ability to use the awareness of the forefront of their engineering specialisation in design and development
- ability to apply norms of engineering practice in their engineering specialisation; 
- ability to consult and apply codes of practice and safety regulations in their engineering specialisation

Investigations and information retrieval

The learning process should enable Bachelor Degree graduates to demonstrate:

- ability to conduct searches of literature, to consult and to critically use scientific databases and other appropriate sources of information, and to carry out simulation and analysis, in order to pursue detailed investigations and research of technical issues
- ability and practical skills to design and conduct experimental investigations, interpret data and draw conclusions
- ability to work in a laboratory/workshop setting
Multidisciplinary competences

The learning process should enable Bachelor Degree graduates to demonstrate:

▪ awareness of the wider multidisciplinary context of engineering
▪ awareness of societal, health and safety, environmental, economic and industrial implications of engineering practice and recognition of the constraints that they pose
▪ awareness of economic, organisational and managerial issues (such as project management, risk and change management) in the industrial and business context
▪ ability to gather and interpret relevant data and handle complexity to inform judgements that include reflection on relevant social and ethical issues;
▪ ability to manage complex technical or professional activities or projects, taking responsibility for decision making
▪ ability to recognise the need for and to engage in independent life-long learning
▪ ability to follow developments in science and technology

Communication and team-working

The learning process should enable Bachelor Degree graduates to demonstrate:

▪ ability to communicate effectively information, ideas, problems and solutions with the engineering community
▪ ability to communicate effectively information, ideas, problems and solutions with the society at large;
▪ ability to function effectively in a national and an international context;
▪ ability to function effectively as an individual and as a member of a team;
▪ ability to cooperate effectively with engineers and non-engineers.
3.2 Master’s degree

Knowledge and understanding

The learning process should enable Master’s Degree graduates to demonstrate:

- in-depth knowledge and understanding of mathematics and sciences underlying their engineering specialisation, at a level necessary to achieve the other programme learning outcomes;
- in-depth knowledge and understanding of engineering disciplines underlying their specialisation, at a level necessary to achieve the other programme learning outcomes;
- critical awareness of the forefront of their specialisation;
- comprehensive knowledge and understanding of applicable materials, equipment and tools, engineering technologies and processes, and of their limitations;
- comprehensive knowledge and understanding of applicable techniques and methods of analysis, design and investigation and of their limitations;
Engineering practice

The learning process should enable Master’s Degree graduates to demonstrate:

- ability to analyse new and complex engineering products, processes and systems within broader or multidisciplinary contexts, and to critically interpret the outcomes of such analyses, by being able to select and apply the most appropriate and relevant, established or new and innovative, analytical, computational and experimental methods and tools,
- ability to conceptualise engineering products, processes and systems;
- ability to select and practical skills to apply the most appropriate and relevant, established or new and innovative, analytical, computational and experimental methods and computer tools in problem solving.
- ability to identify, formulate and solve unfamiliar complex engineering problems in new and emerging areas of their specialisation. The problems can be incompletely defined, have competing specifications and may involve considerations from outside their field of study and have non-technical – societal, health and safety, environmental, economic and industrial – constraints.
- ability to select and practical skills to apply the most appropriate and relevant design methodologies or to use creativity to develop new and original design methodologies.
- ability to design and develop new and complex products (devices, artefacts, etc.), processes and systems, with incompletely defined and/or competing specifications that require integration of knowledge from different fields and non-technical – societal, health and safety, environmental, economic and industrial commercial – constraints;
- practical skills, including the use of computer tools, to realise complex engineering designs
- ability to design using knowledge and understanding at the forefront of their engineering specialisation.
Investigations and information retrieval

The learning process should enable Master’s Degree graduates to demonstrate:

- ability to identify, locate and obtain required data;
- ability to conduct searches of literature, to consult and critically use databases and other sources of information, to carry out simulation in order to pursue detailed investigations and research of complex technical issues;
- practical skills, including the use of computer tools, for designing and conducting complex investigations;
- advanced laboratory/workshop skills and ability to design and conduct experimental investigations, critically evaluate data and draw conclusions;
- ability to investigate the application of new and emerging technologies at the forefront of their engineering specialisation.

Multidisciplinary competences

The learning process should enable Master’s Degree graduates to demonstrate:

- critical awareness of the wider multidisciplinary context of engineering and of knowledge issues at the interface between different fields.
- knowledge and understanding of the non-technical – societal, health and safety, environmental, economic and industrial – implications of engineering practice;
- critical awareness of economic, organisational and managerial issues (such as project management, risk and change management);
- ability to apply norms of engineering practice;
- ability to consult and apply codes of practice and safety regulations;
- ability to integrate knowledge and handle complexity, to formulate judgements with incomplete or limited information, that include reflecting on social and ethical responsibilities linked to the application of their knowledge and judgement;
- ability to manage complex technical or professional activities or projects that can require new strategic approaches, taking responsibility for decision making;
- ability to engage in independent life-long learning;
- ability to undertake further study autonomously.
Communication and team-working

The learning process should enable Master’s Degree graduates to demonstrate:

- ability to use diverse methods to communicate clearly and unambiguously their conclusions, and the knowledge and rationale underpinning these, to specialist and non-specialist audiences in national and international contexts;
- ability to function effectively in national and international contexts, as a member or leader of a team, that may be composed of different disciplines and levels, and that may use virtual communication tools
4 Evaluation of accreditation standards

4.1 Evaluation of individual standards

The accreditation team evaluates the extent to which the programme fulfils the individual standards (see section 2: Accreditation standards) using a three-point scale:

- **Acceptable**: the programme meets the standard fully, even if improvements are still possible;
- **Conditionally acceptable**: the standard is not fully met but the programme can amend it within three years;
- **Unacceptable**: the programme does not meet the standard and cannot amend it within three years

4.2 Recommendation on the accreditation decision

Based on the evaluation of the individual standards, the accreditation team recommends to the FINEEC Committee for Engineering Education that the programme should be either

- **Accredited without reservation**, if all individual standards are acceptable;
- **Accredited with conditions**, if any of the standards is conditionally acceptable and none are unacceptable;
- **Not accredited**, if any of the standards is unacceptable.
Accreditation procedures

The accreditation process consists of the following stages:

1. The HEI makes a request for an accreditation of a particular engineering degree programme
2. Agreement between FINEEC and the HEI
3. FINEEC appoints and trains the accreditation team
4. The HEI compiles the self-evaluation report
5. The accreditation team visits the HEI
6. The accreditation team prepares the report and the HEI checks the report for factual correctness
7. The accreditation team gives its recommendation on the result of the accreditation
8. The FINEEC Committee for Engineering Education’s decides on the result
9. FINEEC publishes the accreditation result and the report
10. The accreditation team and the HEI give feedback to FINEEC

5.1 Request by the higher education institution and the agreement negotiation

A higher education institution (HEI) contacts FINEEC to express its interest in an accreditation and to suggest an expected time frame for the review.

After informal discussions on the details of the accreditation have taken place FINEEC and the HEI sign an agreement regarding the accreditation. The agreement records the following issues:

- The engineering degree programme to be accredited
- The nationality/internationality of the accreditation team and the language used in the accreditation
5.2 Self-evaluation report

The accreditation is based on a detailed self-evaluation report provided by the higher education institution and the visit by the accreditation team.

The HEI submits the self-evaluation report to FINEEC within sufficient amount of time before the accreditation team's visit to the HEI. The exact deadline for the report is included in the agreement between the HEI and FINEEC. Typically, the deadline would be at least four weeks prior to the visit. The length of the report should not be more than 40 pages, excluding appendices.

The structure of the report is described in a template for self-evaluation that is available on the FINEEC website.

5.3 Accreditation team

5.3.1 Composition and selection criteria

The FINEEC Committee for Engineering Education appoints the accreditation team. The team comprises at least three members who represent a balance of relevant experience and expertise.

At least one member of the accreditation team is an academic, at least one a practising engineering professional and at least one a student. FINEEC arranges training for the team members and expects each team member to participate in the training.

The FINEEC Committee for Engineering Education appoints the chair of the review team. Members of the team are on an equal footing as evaluators.

A project manager from FINEEC in charge of the accreditation process takes part in the team's activities as an expert of accreditations.

FINEEC uses the following criteria to select the accreditation team members:

- Good knowledge of the higher education system and engineering education
- Good knowledge of the field of the target programme
- Experience with evaluations, accreditations or audits.
A person is disqualified from acting as a member of the accreditation team if he or she is an interested party or if confidence in his or her impartiality in relation to the HEI subject to the accreditation comes under question. Disqualification is determined in compliance with the provisions of the Finnish Administrative Procedure Act (434/2003, chapter 5, sections 27–29).

Such situations may arise, for example, if the person is employed by the HEI subject to the review or has acted in a position of trust within the institution’s decision-making body. Team members must take it upon themselves to inform FINEEC about any issues that may bear on their disqualification.

A disqualified person may not in any way take part in the accreditation process.

The HEI is given the opportunity to comment on the team’s composition before FINEEC appoints the team, especially from the perspective of disqualification.

FINEEC does not distribute any confidential documentation to the accreditation team before possible disqualifications have been determined and the FINEEC Committee for Engineering Education has appointed the accreditation team.

FINEEC and the accreditation team members sign an agreement that specifies the accreditation-related tasks, fees and any other conditions related to the assignment.

### 5.3.2 Tasks of the team

Members of the accreditation team:

- Examine the self-evaluation report and background material provided by the programme
- Decide on the details of the site visit, prepare for the visit and conduct the visit as planned
- Compile the report, including a proposition regarding the result of the accreditation.

In addition to these tasks, the chair of the accreditation team has a special role. The chair:

- Chairs the accreditation team’s meetings and the site visit
- Takes responsibility for the accreditation task as a whole and for editing the report jointly with the FINEEC project manager
- Presents the results of the accreditation at the FINEEC Committee for Engineering Education meeting
The project manager’s tasks include:

- Organising the training for team members
- Supporting the accreditation team’s activities by taking part in the team’s discussions as an expert in accreditations, and instructing the team as concerns the accreditation criteria
- Being the point of contact between the HEI and the accreditation team
- Editing the accreditation report and taking charge of communication of the outcome of the accreditation.

5.3.3 Training of the team

FINEEC arranges training for accreditation team members and requires that each team member completes the training.

During the training, the team members learn about the operations of FINEEC, the objectives of the accreditations and the accreditation procedure, as well as about the tasks and operating principles of the team. In addition, if the programme to be accredited is from a Finnish institution, the training familiarises international team members with the Finnish higher education system and with engineering education in Finland.

FINEEC builds up and maintains a pool of trained engineering programme reviewers.

5.3.4 Operating principles and ethical guidelines

FINEEC accreditation teams comply with the following operating principles and ethical guidelines in their work:

- Impartiality and objectivity: accreditation team takes an impartial and objective approach towards the subject of the accreditation, as well as recognises their position of power and the responsibility relating to it;
- Transparent and evidence-based evaluation: the accreditation is based on transparent and systematically applied criteria, as well as only on material collected in connection with the accreditation;
- Confidentiality: all information acquired during the process, except for that published in the final report, is confidential;
- Interaction: the accreditation is carried out through good cooperation and interaction with the HEI and the programme.
5.3.5 Remuneration

FINEEC determines the fees of accreditation team members following its adopted principles.

5.4 Visit to the HEI

The accreditation team visits the HEI and the programme in question to verify the information given in the self-evaluation report and to gain more information to support the compilation of the report and the eventual decision on the result of the accreditation.

The length of the visit is at least two days. During the visit, the team discusses with representatives of at least:

- Programme management (head of programme / department / faculty / institution)
- Academic staff members
- Support staff members
- Current and former students
- External stakeholders (employers / industry / representatives of professional engineering organisations)

The team also reviews assessed work with regards to the standard and modes of assessment as well as to the learning achievements of the students. The HEI is expected to have samples of the following available for this accreditation:

- Thesis works, representing the whole scale of grade evaluation
- Project works
- Assessed project reports
- Examination papers
- Continuous assessment
- Other assessed coursework
- Entrance examinations
- Recent research publications relevant to the programme.

In addition to the interviews and the reviews, the team visits the most relevant facilities, such as laboratories or libraries.

At the end of the visit, the accreditation team gives initial feedback to the programme management.
5.5 Report

The accreditation team prepares a review report. The report is based on the self-
evaluation report and background material provided by the programme and on the
observations the team makes during the visit to the HEI. It represents the common
opinion of the accreditation team.

The report follows a given structure:

1. Description of the review process and of the programme
2. Evaluation of the fulfilment of the accreditation standards
3. Recommendation to the FINEEC Committee for Engineering Education

The report template is available on the FINEEC website.

The accreditation report, without the recommendation for the accreditation result, is
submitted to the HEI so it can check the report for factual errors. The accreditation
team then finalises the report and formulates its recommendation based on the
results of the accreditation for the FINEEC Committee for Engineering Education.

5.6 Decision and publication

The FINEEC Committee for Engineering Education decides on the accreditation
result based on the report and the recommendation of the accreditation team. The
accreditation decision defines the exact period of validity of the accreditation and in
the case of a conditional accreditation, the timeframe to fulfil the conditions.

FINEEC publishes the results and the report on FINEEC’s website after the decision
and communicates the result to the HEI and to ENAEE.

FINEEC maintains an online register of accredited programmes.

5.7 Appeals procedure

An HEI unsatisfied with the conduct of the accreditation process by FINEEC, or with
the accreditation result, can make use of FINEEC’s appeals procedure for Engineering
Programme Accreditations that is available on FINEEC’s website.
5.8 Feedback

FINEEC asks the HEI and the accreditation team members to give feedback on the accreditation process. The feedback is used in the continuous development of FINEEC’s operations as a part of its quality management system.
Validity of the accreditation

The accreditation is valid for six years, with the below-mentioned exceptions. The exact period of validity is stated in the accreditation decision and refers to the date of graduation.

If the programme is accredited with conditions, the programme must fulfil the set conditions within the timeframe that is specified in the decision. Within the specified amount of time, the HEI must submit an interim report to the FINHEEC Committee for Engineering Education on how the programme has fulfilled the requirements. The committee may decide that a site visit is needed to confirm the extent to which the requirements have been fulfilled. The committee may also consult the accreditation team on the matter. The committee decides on the continuation of the accreditation based on the HEI’s report and possible site visit and possible consultation with the review team.

If the programme fails to meet the conditions on time, the validity of the accreditation will lapse.

The validity of the accreditation may be reconsidered if significant changes are made to the programme learning outcomes or to the programme’s organisation, implementation and development. Therefore, the HEI is expected to inform FINHEEC if it has made such changes. Significant changes include, but are not limited to, a major redefinition of the programme learning outcomes, the removal of current, or the introduction of new, focus areas and major subjects, or changes to the degrees awarded for graduates.

Normal curriculum development, where the curriculum is gradually updated to reflect new knowledge in the field, the gradual development of the programme’s implementation based on the information given by the quality management system, or the addition of elective parts to the curriculum are examples of non-significant changes that need not to be reported to FINHEEC.
If the HEI desires to renew the accreditation, the programme must be re-accredited prior to the end of the valid accreditation. FINEEC advises to begin the re-accreditation process at least one year prior to the expiration.

The re-accreditation process follows the accreditation procedure described in this document with special attention paid to how the programme has developed since the previous accreditation.
The Finnish Education Evaluation Centre (FINEEC) is an independent, national evaluation agency responsible for the external evaluations of education from early childhood education to higher education in Finland. It implements system and thematic evaluations, learning outcome evaluations and field-specific evaluations. Moreover, FINEEC supports providers of education and training and higher education institutions in matters related to evaluation and quality assurance, as well as advances the evaluation of education.

FINEEC’s Engineering Programme Accreditation is a degree programme specific evaluation that can lead to the European EUR–ACE® Label. The accreditation aims to support the enhancement of quality in engineering degree programmes and increase comparability and recognition of engineering degrees within Europe. The accreditation is voluntary for Finnish higher education institutions and degree programmes.

This manual introduces FINEEC’s accreditation model for engineering degree programmes.