EUR-ACE® Framework Standards and Guidelines

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Foreword

ENAEE (European Network for Engineering Accreditation) was founded on 8 February 2006, after the successful conclusion of the EUR-ACE® Project which was supported by the EU Socrates and Tempus Programmes and by 14 European associations concerned with engineering education. It stemmed from ESOEPE, the "European Standing Observatory for the Engineering Profession and Education", that had been established on 9 September 2000.

ENAEE is rooted in the so-called Bologna process which aims at building a European Higher Education Area (EHEA), by strengthening the competitiveness and attractiveness of European higher education and fostering student mobility and employability.

ENAEE addresses specifically the education of engineers, whose importance is increasing in the global economy. ENAEE aims to enhance and promote the quality of the education of engineering graduates in order to facilitate their professional mobility and to enhance their individual and collective ability to fulfil the needs of economies and of society.

To achieve these goals, ENAEE authorises accreditation and quality assurance agencies to award the EUR-ACE® (EURopean- ACcredited Engineer) label to their accredited engineering degree programmes. To be authorised, an agency must satisfy the standards published by ENAEE in the EUR-ACE® Framework Standards (EAFS) document. These standards incorporate the views and perspectives of the main stakeholders (students, higher education institutions, employers, professional organisations and accreditation agencies). The EAFS document is the precursor to this new document, the EUR-ACE® Framework Standards and Guidelines (EAFSG) published here.

Since 2006, the EUR-ACE® label has, to date, been awarded to more than 1800 engineering programmes, delivered in more than 300 universities in 28 countries in Europe and worldwide. The EUR-ACE® system has hence proven its reliability and its adaptability to diverse national contexts.

However, after eight years of implementation, the time has come to revise the EAFS document, not by altering its fundamental standards which remain unchanged, but to take into account the feedback of ENAEE stakeholders, to clarify and simplify the presentation and to produce this new document, the EUR-ACE® Framework Standards and Guidelines (EAFSG), in a web-based format.

Prof. Bernard Remaud

President March 2015

EUR-ACE® Framework Standards and Guidelines

1. General Introduction

(a) The mission of ENAEE is to serve the public and society through the promotion and advancement of engineering education in Europe and abroad. ENAEE aims at building a pan-European framework for the accreditation of engineering education programmes, in order to enhance the quality of engineering graduates, to facilitate the mobility of professional engineers and to promote quality and innovation in engineering education.

To achieve these goals, ENAEE has established a de-centralized system for the standards of accreditation of engineering education degree programmes, leading to pan-European recognition of national accreditation decisions.

Membership of ENAEE is open to all bodies concerned with educational and professional standards in engineering throughout the European Higher Education Area (EHEA) and beyond. Such bodies may include accreditation and quality assurance agencies, professional organisations, associations of higher education institutions, employers' associations, and engineering student bodies and their associations.

(b) ENAEE carries out its mission by evaluating quality assurance and accreditation agencies in the EHEA in respect of their standards and procedures when accrediting engineering degree programmes.

Those agencies which satisfy ENAEE in respect of these matters are authorised by ENAEE to award the EUR-ACE® label to the engineering degree programmes which they accredit.

It should be noted that ENAEE does not accredit engineering degree programmes. Using the standards specified in this document (EAFSG), ENAEE evaluates the policies and procedures implemented by accreditation and quality assurance agencies which have applied for authorisation to award the EUR-ACE® label to the engineering degree programmes which these agencies accredit.

(c) The EAFSG described here represent a revision to the original document (known as EAFS) produced in 2006. While the original standards remain unchanged, changes based on feedback and usage have been made. They constitute the basis upon which authorisation to award the EUR-ACE® label is granted to quality assurance and accreditation agencies. They are intended to be widely applicable and inclusive so that they can be applied to all branches of engineering; and to reflect the diversity of engineering degree programmes in the EHEA, which provides the education necessary for graduates to enter the engineering profession and to have their qualifications recognised throughout the area.

(d) The EAFSG are for the use of established agencies which have well developed policies and procedures that are continuously under review. They are also aimed at new agencies which may wish to use the information in the EAFSG to assist them as they develop their policies and procedures for the accreditation of engineering degree programmes and apply for authorisation to award the EUR-ACE® label.

(e) The general basis to the EAFSG can be found in the following policies:

- The overarching framework of qualifications of the European Higher Education Area **(EHEA Framework or QF-EHEA)** as adopted by the Ministers of Education of the Bologna Process at their meeting in Bergen in May 2005, including the **Dublin Descriptors.**
- **The European Qualifications Framework for Lifelong Learning (EQF)** as developed by the European Commission and signed on 23 April 2008 by the Presidents of the European Parliament and of the Council of the European Union.

(f) The EAFSG have been formulated to be substantially compliant with the relevant sections of the **Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG)** as adopted by the Bologna Process ministerial summit in Bergen (Norway) in 2005 and which were revised in 2015.

(g) Throughout the EAFSG, the term “engineering graduate” is used to describe someone who successfully completes an accredited degree programme in engineering. The term “engineer” has been avoided because of the confusion that could arise from its widely different interpretations throughout Europe and worldwide, including specific regulatory meanings in some countries. It is for the appropriate authority in each country to decide if a qualification is sufficient for engineering registration or qualification in that country, or if further education, training or industrial experience is necessary. The EUR-ACE® label will assist such decisions, and particularly those that involve trans-national recognition.

(h) The standards which ENAEE requires of engineering degree programmes which are accredited by agencies are described here in Section 2, **Standards and Guidelines for Accreditation of Engineering Programmes.**

(i) The standards which ENAEE requires of agencies are described here in Section 3, **Standards and Guidelines for Accreditation Agencies.**

(j) The process of authorising an agency to award the EUR-ACE® label is described in **EUR-ACE® Label Authorisation Process.**

2. Standards and Guidelines for Accreditation of Engineering Programmes

2.1 Introduction

The EUR-ACE® Standards and Guidelines for Accreditation of Engineering Programmes (EAFSG) are described here in terms of Student Workload Requirements (Sect 2.2), Programme Outcomes (Sect. 2.3) and Programme Management (Sect. 2.4).

The Student Workload Requirements and the Programme Outcomes are compliant with the overarching **Framework of Qualifications for the European Higher Education Area (EQF),** adopted by the Bergen Conference of European Ministers responsible for Higher Education on 19-20 May 2005. The framework "*comprises three cycles (including, within national contexts, the possibility of intermediate qualifications), generic descriptors for each cycle based on learning outcomes, and credit ranges in the first and second cycles*".

The overall result of the application of the EQF is a range of Bachelor and Master Degree programmes in engineering now offered in European Higher Education Institutions. These are described here in terms of the European Credit Transfer System as follows:

a) Fulltime Bachelor degree programmes in engineering are now of 180, 210 or 240 ECTS credits.

b) Fulltime Master degree programmes in engineering are of 60, 90 or 120 ECTS credits.

As established by the "Recommendation of the European Parliament and of the Council" of 23 April 2008, the descriptor for the first cycle in the Framework for Qualifications of the European Higher Education Area (Bologna process) corresponds to the learning outcomes for the EQF, level 6. The descriptor for the second cycle in the Framework for Qualifications of the European Higher Education Area corresponds to the learning outcomes for the EQF, level 7.

The Programme Outcomes are consistent with the provisions of the EQF.

The Programme Management requirements are consistent with the **Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG)**, adopted by the 2005 Bergen Conference of European Ministers responsible for Higher Education.

2.2 Student Workload Requirements

The workload requirements are described using ECTS credits.

ENAEE describes the Programme Outcomes for Bachelor and Master Degree programmes normally structured as follows:

- Bachelor Degree programmes, of a minimum of 180 ECTS credits.
- Master Degree programmes, of a minimum of 90 ECTS credits (60 in some educational systems).

- Master Degree programmes which are integrated and which, normally, do not include the award of a Bachelor Degree, should comprise ECTS credits consistent with the above: i.e. a minimum of 270 ECTS credits (240 in some education systems).

2.3 Programme Outcomes Framework

(a) **Programme Outcomes** describe the knowledge, understanding, skills and abilities which an accredited engineering degree programme must enable a graduate to demonstrate. The Programme Outcomes specified below apply to accredited programmes which are to be awarded a EUR-ACE label by an authorised agency. In this document, the term **learning outcome** is used only to describe the knowledge, understanding, skills and abilities which apply to individual course units/modules.

(b) The Programme Outcomes specified in this document are intended to be applicable to the full range of Bachelor and Master Degree programmes in engineering offered in European HEI's. They have to be considered as the 'minimum threshold' defined by the ENAEE community and to be fulfilled in order to assure the quality of engineering programmes.

(c) The Programme Outcomes can be used in both the design (by engineering academics) and the evaluation (by accreditation agencies) of programmes in all branches of engineering and for different profiles.

(d) The standards describe the Programme Outcomes that accredited programmes must meet, but do not prescribe how they are realised. Consequently, no restriction is implied or intended by the EAFSG in the design of programmes to meet the specified Programme Outcomes. HEI's retain the freedom to formulate programmes with an individual emphasis and character, including new and innovative programmes, and to prescribe conditions for entry into each programme.

(e) The Programme Outcomes are described here separately for both Bachelor and Master Degree programmes with reference to the following eight learning areas:

- Knowledge and understanding;
- Engineering Analysis;
- Engineering Design;
- Investigations;
- Engineering Practice;
- Making Judgements;
- Communication and Team-working;
- Lifelong Learning.

(f) The **ENAEE/IEA Glossary of Terminology** is used to verify terms used in this document.

2.3.1 Programme Outcomes for Bachelor Degree Programmes

Knowledge and Understanding

The learning process should enable **Bachelor Degree graduates to demonstrate**:

- knowledge and understanding of the mathematics and other basic sciences underlying their engineering specialisation, at a level necessary to achieve the other programme outcomes;
- knowledge and understanding of engineering disciplines underlying their specialisation, at a level necessary to achieve the other programme outcomes, including some awareness at their forefront;
- awareness of the wider multidisciplinary context of engineering.

Engineering Analysis

The learning process should enable **Bachelor Degree graduates to demonstrate**:

- ability to analyse complex engineering products, processes and systems in their field of study; to select and apply relevant methods from established analytical, computational and experimental methods; to correctly interpret the outcomes of such analyses;
- ability to identify, formulate and solve engineering problems in their field of study; to select and apply relevant methods from established analytical, computational and experimental methods; to recognise the importance of non-technical –societal, health and safety, environmental, economic and industrial - constraints.

Engineering Design

The learning process should enable **Bachelor Degree graduates to demonstrate**:

- ability to develop and design complex products (devices, artefacts, etc.), processes and systems in their field of study to meet established requirements, that can include an awareness of non-technical – societal, health and safety, environmental, economic and industrial– considerations; to select and apply relevant design methodologies;
- ability to design using some awareness of the forefront of their engineering specialisation.

Investigations

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, to carry out simulation and analysis in order to pursue detailed investigations and research of technical issues in their field of study;
- ability to consult and apply codes of practice and safety regulations in their field of study;
- laboratory/workshop skills and ability to design and conduct experimental investigations, interpret data and draw conclusions in their field of study.

Engineering Practice

The learning process should enable **Bachelor Degree graduates to demonstrate**:

- understanding of applicable techniques and methods of analysis, design and investigation and of their limitations in their field of study;
- practical skills for solving complex problems, realising complex engineering designs and conducting investigations in their field of study;
- understanding of applicable materials, equipment and tools, engineering technologies and processes, and of their limitations in their field of study;
- ability to apply norms of engineering practice in their field of study;
- awareness of non-technical -societal, health and safety, environmental, economic and industrial - implications of engineering practice;
- awareness of economic, organisational and managerial issues (such as project management, risk and change management) in the industrial and business context.

Making Judgements

The learning process should enable **Bachelor Degree graduates to demonstrate**:

- ability to gather and interpret relevant data and handle complexity within their field of study, to inform judgements that include reflection on relevant social and ethical issues;
- ability to manage complex technical or professional activities or projects in their field of study, taking responsibility for decision making.

Communication and Team-working

The learning process should enable **Bachelor Degree graduates to demonstrate**:

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

Lifelong Learning

The learning process should enable **Bachelor Degree graduates to demonstrate**:

- ability to recognise the need for and to engage in independent life-long learning;
- ability to follow developments in science and technology.

2.3.2 Programme Outcomes for Master Degree Programmes

Knowledge and Understanding

The learning process should enable **Master 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 outcomes;

- in-depth knowledge and understanding of engineering disciplines underlying their specialisation, at a level necessary to achieve the other programme outcomes;
- critical awareness of the forefront of their specialisation;
- critical awareness of the wider multidisciplinary context of engineering and of knowledge issues at the interface between different fields.

Engineering Analysis

The learning process should enable **Master Degree graduates to demonstrate**:

- ability to analyse new and complex engineering products, processes and systems within broader or multidisciplinary contexts; to select and apply the most appropriate and relevant methods from established analytical, computational and experimental methods or new and innovative methods; to critically interpret the outcomes of such analyses ;
- ability to conceptualise engineering products, processes and systems;
- ability to identify, formulate and solve unfamiliar complex engineering problems that are incompletely defined, have competing specifications, may involve considerations from outside their field of study and non-technical – societal, health and safety, environmental, economic and industrial – constraints; to select and apply the most appropriate and relevant methods from established analytical, computational and experimental methods or new and innovative methods in problem solving;
- ability to identify, formulate and solve complex problems in new and emerging areas of their specialisation.

Engineering Design

The learning process should enable **Master Degree graduates to demonstrate**:

- ability to develop, to design new and complex products (devices, artefacts, etc.), processes and systems, with specifications incompletely defined and/or competing, that require integration of knowledge from different fields and non-technical - societal, health and safety, environmental, economic and industrial commercial – constraints; to select and apply the most appropriate and relevant design methodologies or to use creativity to develop new and original design methodologies.
- ability to design using knowledge and understanding at the forefront of their engineering specialisation.

Investigations

The learning process should enable **Master 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;
- ability to consult and apply codes of practice and safety regulations;
- 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.

Engineering Practice

The learning process should enable **Master Degree graduates to demonstrate**:

- comprehensive understanding of applicable techniques and methods of analysis, design and investigation and of their limitations;
- practical skills, including the use of computer tools, for solving complex problems, realising complex engineering design, designing and conducting complex investigations;
- comprehensive understanding of applicable materials, equipment and tools, engineering technologies and processes, and of their limitations;
- ability to apply norms of engineering practice;
- 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)

Making Judgements

The learning process should enable **Master Degree graduates to demonstrate**:

- 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.

Communication and Team-working

The learning process should enable **Master 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.

Lifelong Learning

The learning process should enable **Master Degree graduates to demonstrate**:

- ability to engage in independent life-long learning;
- ability to undertake further study autonomously.

2.4 Programme Management

(a) Accreditation agencies should confirm that engineering degree programmes, for which a HEI seeks accreditation, are managed to,

- achieve the programme aims;
- provide a teaching and learning process that enables students to demonstrate achievement of Programme Outcomes;
- provide adequate resources;
- monitor the rules for student admission, transfer, progression and graduation; and
- comply with internal quality assurance procedures.

b) The five standards below specify the key areas of programme management that must be evaluated if an agency is to be authorised to award the EUR-ACE® label. The guidelines that follow the standards are not prescriptive, but are intended to assist agencies and HEIs in meeting the standards. Programme managers are free to satisfy the standards in accordance with their own traditions and resources.

2.4.1 Programme Aims.

The aims of accredited programmes must reflect the needs of employers and other stakeholders. The programme outcomes must be demonstrably consistent with the aims.

The aims should take into account employment opportunities for graduates, potential developments in technology, the needs of employers, the wide range of applications of engineering, postgraduate opportunities for graduates, the mission of the university and the interests of students.

2.4.2 Teaching and Learning Process

The teaching and learning process must enable engineering graduates to demonstrate the knowledge, understanding, skills and abilities specified in the Programme Outcomes. The programme curriculum must specify how this is to be achieved.

The curriculum should give comprehensive information on all the modules in the degree programme, including the syllabus, the module learning outcomes, the methodology of teaching and learning, credit allocation, the method of module assessment, and any pre-requisite or co-requisite modules or other programme requirements. The curriculum should ensure that the module learning outcomes aggregate to the programme learning outcomes, including the effect of student choice of modules.

The learning process should be sufficiently flexible to accommodate different entry qualifications of students and different learning styles. If the programme includes time spent in industry or in another HEI, it should be assessed in the context of its contribution to the achievement of the Programme Outcomes.

The assessment of students should evaluate achievement of the specified module learning outcomes, and be both rigorous and fair. Wherever possible there should be second marking of student work or moderation of assessments. Students should have an opportunity to redeem work that is assessed as being below standard, provided this can be done without compromising output standards.

Independent and external scrutiny of the assessment of students, and of the decisions on progress and completion, are effective in ensuring that output standards are maintained. The arrangements for any such scrutiny should be documented.

2.4.3 Resources

The resources to deliver the programme must be sufficient to enable the students to demonstrate the knowledge, understanding, skills and abilities specified in the Programme Outcomes.

The number, qualifications and experience of the teaching staff should be adequate to teach the programme to the standard specified in the Programme Outcomes. The programme should be supported by an effective team of technical and administrative staff. There should be arrangements in place for ensuring that staff are updated to use and apply new technologies and receive training as and when required.

The laboratory, computing and workshop facilities should have the equipment necessary to support the programme; the arrangements for safe access by students should ensure appropriate opportunities for student practical activities, particularly to support project work.

Student support services, including but not limited to, tutoring, library and other information resources, assistance with external placements, should be readily accessible by students.

The resources necessary to deliver the programme should be supported by an adequate budget.

2.4.4 Student admission, transfer, progression and graduation

The criteria for student admission, transfer, progression and graduation must be clearly specified and published, and the results monitored.

Students should be informed of the qualifications necessary to enter the programme and of the regulations necessary to progress to completion. The criteria for students to transfer into later stages of the programme should be clearly specified.

Records of student achievement provide essential information for the review and development of programmes. There should be arrangements for monitoring the progress of students through the programme against their entry qualifications, so as to provide essential data for reviewing entry to the programme. In particular the number of, and reasons for, non-completions should be recorded. The overall performance of students in individual modules should be noted in order to identify assessment results that are significantly different from the norm.

2.4.5 Internal Quality Assurance

Accredited engineering degree programmes must be supported by effective quality assurance policies and procedures.

The programme should have quality assurance procedures that are consistent with the HEI quality assurance policy. It would be expected that there is a defined and documented procedure for reviewing the programme at regular intervals using all relevant data, including an evaluation of student achievement against the stated programme aims.

Feedback should be obtained in an agreed format from the students on an accredited programme on all taught modules in the programme, to enable the effectiveness of each module to be evaluated. There should be clearly understood arrangements for the day to day management of the programme to resolve any urgent and immediate problems.

Information about all aspects of the programme, including the quality assurance procedures, should be publicly available.

3. Standards and Guidelines for Accreditation Agencies

3.1 Introduction

(a) ENAEE requires quality assurance and accreditation agencies awarding the EUR-ACE® label to apply the standards described here. These standards apply to the effectiveness of the agency accreditation procedures in the evaluation of the learning process of the degree programme being accredited and its compliance with the Student Workload Requirements, Programme Outcomes and Programme Management specified above, for Bachelor and Master Degree programmes respectively.

(b) The seven standards specified below apply to the quality assurance of the internal processes of accreditation agencies. The standards are mandatory but the guidance is not intended to be prescriptive. It is recognised that agencies that accredit engineering programmes will have different histories and traditions, and will have established internal organisation and accreditation processes that are tuned to the needs of their particular communities and relevant regulatory requirements. Nevertheless it would be expected that agencies will incorporate processes consistent with the standards that are accepted internationally as providing the basis for effective accreditation of engineering degree programmes. This guidance is intended to indicate methods that have gained general approval through widespread use, and to reflect a consensus of good practice.

An agency that uses methods and procedures differing from those indicated by the guidelines should provide evidence that its methods and procedures comply fully with the standards described here.

3.2. Programme Evaluation and Accreditation

3.2.1. Methods and Procedures

The methods and procedures of the agency must ensure that engineering degree programmes are accredited accurately in accordance with the agency's established standards.

This standard is concerned with the processes used by the agency to establish, review and update its requirements of accredited programmes, of the infrastructure and resources of the HEI to deliver programmes and also of the agency procedures for evaluating programmes. Agencies need to be receptive to innovation in engineering technologies and teaching methods, to avoid accreditation inhibiting the introduction of new subjects and ways of teaching.

Established accreditation agencies will have a wide range of different arrangements for consulting all stakeholders to ensure that their accreditation processes are conducted efficiently and effectively. Whatever the arrangement, the agency procedures should ensure that its standards and methods of working are reviewed at regular intervals, and updated as required. The use of international accreditors is one way of ensuring that the agency standards and practices are consistent with international developments.

In addition to ensuring that the specified standards of engineering education are maintained, accreditation agencies can have an important role in the development of engineering programmes through, for example, sharing good practice.

3.2.2. Documentation

The accreditation standards and procedures must be publicly available in an accessible format.

The details of the accreditation standards and procedures should be widely available. A university applying for accreditation of a programme will require a clear statement of the standards and procedures that will be used to assess its application. It would be expected that agencies using web-based publishing have effective procedures for controlling changes to such documents.

Agencies have widely different publication practices, often arising from long-standing traditions that determine the format and number of publications, but the expectation would be that all documents relevant to accreditation are publicly available, and contain explicit statements of the accreditation standards. The documentation should provide comprehensive information on the procedures used in evaluating programmes, including, but not limited to, format of self-assessment report, timetable of observation visit, membership of accreditation panels and other committees and a template for accreditation reports.

There should be an effective arrangement to ensure that changes in documentation arising from improvements in presentation and procedures are communicated to HEIs and other stakeholders. If the documentation is available on a website it should be properly signposted and readily downloaded.

3.2.3. Accreditation Process

The accreditation process must be effective in acquiring all the evidence necessary to make decisions.

The value of accreditation evaluations to universities, and to the wider engineering profession, is enhanced by a process designed to acquire the information necessary to make an informed decision. Agencies should ensure that the specification for the contents of the self-assessment report, and the agenda for the site visit by the accreditation panel are structured to obtain the required information. Accreditation evaluations are demanding of the time and resources of universities and therefore the process should not make unnecessary or excessive demands.

The timetable for the accreditation process should provide adequate time to enable the HEI to assemble the relevant information. The format, content and detail of the evidence to be provided in the self-assessment report submitted by the HEI should be clearly specified. The agency should list the supporting documentation that is to be provided either before or during the visit of the accreditation panel, such as minutes of meetings, examples of assessed student work, and quality assurance procedures.

The collective experience of agencies in many countries is that it is important to train the members of accreditation panels to assess evidence presented in different formats, ask relevant follow up questions, and make balanced judgements. The number and expertise of the panel membership should be determined by the nature of the programmes being assessed. Usual practice is that the accreditation panel consists of at least three persons, with appropriate representation from all relevant sectors of the engineering profession.

The self-assessment report and other specified information should, typically, be available to the accreditation panel about one month in advance of the site visit. The duration of the site visit will be determined by the need to collect the required evidence, and to investigate aspects of the self-assessment report. The agenda for the visit should be specified in advance by the agency, but may be changed by the accreditation panel depending on circumstances. It would be expected that the agenda would schedule an initial meeting of the panel to review the submitted evidence, and a programme of meetings as required with HEI management, teachers, students, graduates, and employers. There should also be an opportunity for the panel to inspect the teaching and other supporting facilities, and to evaluate assessed student work. In order that the time available during the visit is used efficiently, some agencies request samples of assessed student work to be sent to the accreditation panel ahead of the visit, thereby enabling the work to be scrutinised more carefully.

If the agency uses a template for the report of the accreditation panel, it should be publicly available to ensure that the HEI is fully aware of the basis for accreditation decisions.

3.2.4 Decision-making

Accreditation decisions must be demonstrably accurate, consistent and unbiased.

The decisions of the agency need to be accepted by all stakeholders, if accreditation is to be accepted as evaluating the quality of engineering programmes. The agency should retain documented evidence of how decisions are reached.

Agency decisions on accreditation should be based on careful and unbiased evaluation of the evidence provided by the university, and in the report of the accreditation panel. The decisions should be made by a board appointed for that purpose, and composed of representatives from all sectors of the profession. The report (devoid of any recommendations) should have been cleared for factual accuracy by the university prior to consideration by the board, and it would be expected that one of the members of the accreditation panel would present the report to the board. Any member of the board who has (or has had) a connection of any sort with the university concerned should not be present during the decision making process.

It would be expected that the agency has documented procedures for appointing members to the board, and would maintain a balance of representation between all sectors of the profession. The terms of reference of the board, and its rules and procedures should be documented and publicly available. The board should have a range of possible decisions on accreditation to ensure that it can act constructively in the best interests of the profession.

The agency should have formal procedures for communicating decisions to HEIs, for recording decisions, for following up any actions required, and for any appeals against decisions.

3.2.5 Publication

The agency must publish the outcome of the accreditation evaluation.

Publication of the decision to accredit a programme, and the period for which the accreditation is valid, will contribute to maintaining the standard of engineering programmes.

The list of programmes accredited by the agency should be published including the period for which the accreditation is valid. The university should also be able to use accreditation of its programmes in publicity for prospective students. Agencies should also give consideration to publishing some parts of the report of the accreditation panel, subject to any limitations arising from confidentiality and other relevant considerations.

3.3 Quality Assurance of Accreditation Agency

3.3.1 Administration

The management, organisation, and administration of the agency must ensure that the accreditation functions of the agency are implemented accurately and reliably.

Agencies will have developed a wide range of different practices to administer its accreditation procedures, and will usually have arrangements that are well tried and understood. Nevertheless because an agency is making decisions on the quality of programmes on behalf of the engineering profession, it is important to review its practices from time to time, and to subject them to external scrutiny. Its organisation and processes should be open and transparent to ensure the efficiency and integrity of its accreditation decisions.

The agency's administrative arrangements, procedures and rules should be fully documented and publicly available. Such arrangements should include, but not be limited to, the procedures for membership of the decision making board and other relevant committees, for making accreditation decisions, and for selecting accreditation panels. It would be expected that the agency has quality assurance procedures to evaluate its activities. Such procedures should include a report at regular intervals, typically annually, to record and review its activities, and which should be independently, preferably externally, assessed.

3.3.2 Status and Resources

The agency must be independent of outside influences and have adequate resources to undertake accreditation.

The purpose of accreditation is to ensure the standard of engineering degree programmes. Therefore the agency should be recognised, formally or otherwise, by the engineering profession as having that responsibility. The standards should have been established collectively by the profession. Furthermore, it is essential that the agency is independent of all influences or conflicts of interest that might impact on the integrity of its decisions on accreditation. In order to preserve its independence it should have access to adequate financial resources and the technical expertise necessary to implement accreditation effectively.

The value of the accreditation of programmes requires that the engineering profession recognises the agency as the organisation with the specific responsibility for ensuring the quality of engineering programmes. Such recognition can be formal and legally validated, or informal and validated by wide representation of the profession on the agency board, committees and panels.

If the standards of an agency are substantially compliant with the requirements specified in the **Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG),** then the agency is eligible to apply to be a member of **ENQA (European Association for Quality Assurance in Higher Education),** and to be listed in the **European Quality Assurance Register (EQAR).**

APPENDICES

The following appendices are provided as a guide to assist HEIs and accreditation and quality assurance agencies when these agencies are applying for authorisation to award the EUR-ACE® label. They are not intended to be prescriptive. They are an indication of what ENAEE would expect to form the basis of both the self-assessment review of an engineering degree programme by a HEI, and of the accreditation process of the agency, if the required standards are to be achieved.

Appendix 1 - Guidelines on Programme Self-Assessment Review by HEI and Accreditation Requirements of Agency

<table>
<tr><th colspan="2">1. Programme Aims</th></tr>
<tr><td rowspan="2">1.1 Educational needs of the labour market and other stakeholders</td><td>Documentation to be provided
Relevant industry and labour market organisations and other stakeholders consulted, and methods and schedule of consultation.
Identified educational needs of the labour market and other stakeholders.</td></tr>
<tr><td>Questions to be considered
Were the relevant industry and labour market organisations and other stakeholders consulted? Was the methodology and schedule of consultation adequate in order to identify their educational needs?
Have the educational needs of these stakeholders been identified in a way which facilitates the definition of the programme aims and programme outcomes, i.e. in terms of professional profiles and/or functions/roles/activities expected of the graduates and associated required competences?</td></tr>
<tr><td rowspan="2">1.2 Programme Aims</td><td>Documentation to be provided
Set of Programme Aims</td></tr>
<tr><td>Questions to be considered
Have the programme aims been developed in terms of professional profiles of the engineering graduates and/or roles/activities students are to be prepared for, and the associated competences to be developed and obtained by the students during the learning process?
Are the programme aims consistent with the mission of the institution that the programme belongs to and the identified educational needs of the labour market?</td></tr>
<tr><td rowspan="2">1.3 Programme outcomes</td><td>Documentation to be provided
Set of programme outcomes.</td></tr>
<tr><td>Questions to be considered
Have the programme outcomes been established in terms of what students are expected to know, understand and/or be able to demonstrate after completion of the learning process?
Are the programme outcomes consistent with the relevant national qualifications framework, if any, with the EUR-ACE® Programme Outcomes for accreditation and with the established programme aims?</td></tr>
</table>

2. Teaching and Learning Process.	
2.1 Teaching and Learning Process	**Documentation to be made available / to be required** Curriculum and description of its characteristics. Characteristics of the modules/course units (in particular: number of ECTS credits, learning outcomes, content, typologies of teaching activities, assessment of students' learning, pre-requisites, didactic material). Documentation of the suitability of the curriculum to the achievement of the programme outcomes.
	Questions to be considered Does the totality of the learning outcomes of the modules accumulate to constitute the programme outcomes? Is the curriculum formally approved by the HEI the programme belongs to? Does the curriculum embed a student-centred learning and teaching approach that enables flexible learning paths and encourages students to take an active role in co-creating the learning process?
2.2 Assessment of students' learning	**Documentation to be provided** *Note: The methods and criteria of assessment of the students' learning should be included in the characteristics of the course units/modules.*
	Questions to be considered Do the assessment methods and criteria provide evidence of their capacity to check the effective achievement of the intended course unit/module learning outcomes by the students and ensure trust that the level of achievement by the students is assessed in a credible way?
2.3 Planning of the learning process	**Documentation to be provided** Calendar and timetable of didactic activities and examinations.
	Questions to be considered Has the development of the learning process been planned in order to enable students to achieve the programme outcomes in the expected time?
2.4 Management of the learning process	**Documentation to be provided** Description of how the teaching and learning process and student assessment are managed including a feedback loop in relation to the quality of the learning process and the assessment of students. This should include statistical analysis and documentation used.
	Questions to be considered How does the management of the learning process assure achievement of the programme aims and the programme outcomes? Do the results of the quality control of the assessment tests attest their adequacy and appropriateness? Is the achievement of the learning outcomes of course units/modules adequately assessed?

3. Resources	
3.1 Teaching staff	**Documentation to be provided** Curricula vitae of teaching staff. Teaching support staff. Recruitment policy in the selection of the teaching staff. Opportunities offered to the teaching staff to improve their teaching skills and the use of new technologies.
	Questions to be considered Are the teaching staff appointed according to pre-defined recruitment criteria? Are the teaching staff quantitatively and qualitatively adequate for the achievement of the programme outcomes by students? Are the teaching support staff qualitatively adequate for the achievement of the established programme outcomes by students? Does the programme offer the teaching staff the opportunity to improve their teaching skills and the use of new technologies?
3.2 Facilities and support staff	**Documentation to be provided** Classrooms used by the programme, with the equipment available. Rooms for individual study used by the students of the programme, with the equipment available. Laboratories/workshops used by the programme, with the equipment and technical staff available. Libraries used by the students of the programme, with the equipment, services and library staff available. Other resources and special initiatives.
	Questions to be considered Are the facilities at the disposal of the programme, with the associated equipment, quantitatively and qualitatively adequate for the development of the established programme aims as designed and planned, and enable the application of the established didactic methods? Is there adequate technical and library staff?
3.3 Financial resources	**Documentation to be provided** Needs and availability of financial resources.
	Questions to be considered Are the financial resources available to the programme adequate for the development of the learning process as designed and planned?
3.4 Student support services	**Documentation to be provided** Organization, management and activities of student support (career advice, tutoring and assistance) services, and administrative staff available.

	Questions to be considered Does the programme provide student support (career advice, tutoring and assistance) services relevant to the learning process and enable students' learning and progression easier? Are the administrative staff quantitatively and qualitatively adequate for the effective management of the student support services?
3.5 Partnerships	**Documentation to be provided** Partnerships which enable training periods outside the university. Partnerships which enable international study mobility periods.
	Questions to be considered Are the partnerships with public and/or private bodies for training periods outside the university adequate quantitatively and qualitatively to the achievement of the programme outcomes? Are the partnerships with foreign universities or other HEI's for international mobility adequate quantitatively and qualitatively to the achievement of the programme outcomes?
4. Student Admission, transfer, progression and graduation	
4.1 Rules governing the students' academic career	**Documentation to be provided** Qualifications and requirements for admission to the programme and methods of assessment of their possession by the students. Regulations for the recognition of higher education qualifications, periods of study and prior learning. Criteria for the management of the students' progression in their studies. Certification of students' studies successfully completed.
4.2 Entrance students	**Documentation to be provided** Results of the assessment of the possession of the admission requirements. Results of the examination performance in the first year.
	Questions to be considered Do the results of the student examination performance in first year provide evidence of the programme attractiveness and the adequacy of the entrance requirements? Is the first year curriculum designed to motivate students towards studying engineering?
4.3 Student assessment	**Documentation to be provided** Result of the assessment of the students' learning in each module and each year.

	Questions to be considered Do the results of the monitoring of the students' achievement of the learning outcomes provide evidence of the effectiveness of the learning process in the course units/modules?
4.4 Student progression	**Documentation to be provided** Results of the monitoring of student progression in the different course years. Results of the monitoring of dropouts. Results of the monitoring of the credits acquired by the students who pass from one course year to the next one. Results of the monitoring of the duration of studies leading to graduation.
	Questions to be considered Do the results of the monitoring of students' progression in their studies provide evidence of the effectiveness of the learning process?
5. Internal Quality Assurance	
5.1 Policy and processes for the quality assurance of programmes	**Documentation to be provided** Policy for the quality assurance of programmes of the HEI. Organizational structure for the quality assurance of programmes and decision-making processes of the HEI.
	Questions to be considered Does the HEI conform to public policy for the quality assurance of programmes? Has the HEI an effective management system and effective decision-making processes for the quality assurance of programmes?
5.2 Management system of the programme	**Documentation to be provided** Quality assurance policies and procedures relevant to the programme.
	Questions to be considered Does the programme participate satisfactorily in the HEI quality assurance processes and implement relevant findings?
5.3 Programme review and development	**Documentation to be provided** Policies and procedures for programme review and development. Results of most recent programmatic review.
	Questions to be considered Does the programme periodically review needs and objectives, learning process, resources, results and management system, in order to guarantee their continuing relevance and effectiveness? Does it promote the improvement of the effectiveness of the processes of programme management and of the associated results?

<table>
<tr><td rowspan="2">5.4 Student feedback on the learning process</td><td>Documentation to be provided
Students’ opinion on the quality of course units/modules.
Students’ opinion on the training periods outside the university.
Students’ opinion on the periods of international mobility.
Opinion of the final year students on the learning process and support services.</td></tr>
<tr><td>Questions to be considered
Is the monitoring of student opinion adequate in relation to completeness of information gathered and response rate?
Do the results of the monitoring of student opinion on the learning process provide evidence of the adequacy and effectiveness of the learning process and of student support services?</td></tr>
<tr><td rowspan="2">5.5 Engineering graduates’ placement</td><td>Documentation to be provided
Results of the monitoring of the graduates’ job placement.
Results of the monitoring of student progression to Master programmes (only for Bachelor programmes).
Results of the monitoring of student progression to Doctoral studies (only for Master programmes).
Results of the monitoring of employed graduates’ opinions on the education received.
Results of the monitoring of employers’ opinion on the graduates’ education</td></tr>
<tr><td>Questions to be considered
Do the results of the monitoring of the engineering graduates’ job placement and of the employed graduates’ and employers’ opinions on the graduates’ education provide evidence of the qualification's value, of the appropriateness of the programme aims and the programme outcomes to the educational needs of the labour market?</td></tr>
<tr><td rowspan="2">5.6 Public availability of information</td><td>Documentation to be provided
Documentation in relation to the quality assurance of the programme as publicly provided.</td></tr>
<tr><td>Questions to be considered
Does the programme make publicly available full, up to date, easily accessed information, both quantitative and qualitative, on its objectives, learning process, resources, results and management system?</td></tr>
</table>

Appendix 2 – Guidelines on Programme Accreditation Process

1. Application

The accreditation procedure should start with the application for accreditation by the HEI.
The self-assessment report should consider all the questions set out in Appendix 1, and submit relevant documentation at least one month before the visit of the accreditation team.

2. Composition of the Accreditation Panel

The accreditation process is based on principles of peer review and normally the members of the accreditation panel should be from the national jurisdiction of the HEI concerned. The accreditation panel should consist of at least three persons, preferably more, including a student. At least one member of the accreditation panel should be an academic and at least one a practising engineering professional. All members of the accreditation panel should be sufficiently trained to enable them to participate expertly in the accreditation process and their curricula vitae should be publicly available. Accreditation agencies should promote short training courses for potential members of accreditation panels.
To facilitate the dissemination of good practice in accreditation, the accreditation agency should consider including external observers from outside the jurisdiction.
From each member of the accreditation panel, a statement should be received indicating that a conflict of interest does not exist between the member and the HEI at which one or several programmes are being accredited. This statement should be received prior to any documentation being distributed.

3. Duration of Site Visit

The site visit should last at least two days, including any preliminary meetings to evaluate the documentation and the visit to the HEI.

4. Agenda for Site Visit

The site visit should include:

- preliminary meeting of the accreditation panel prior to the visit to identify what information is to be obtained during the visit;
- meeting with head of department / university;
- meeting with academic and support staff members;
- meetings with current and former students;
- meeting with employers / industry / professional engineering organisations representatives;
- visits to facilities (libraries, laboratories, etc.);
- review of project work, final examination papers and other assessed work (with regards to the standard and modes of assessment as well as to the learning achievements of the students);
- feedback to the HEI at the end of the visit.

5. Programme Evaluation

a) Good practice arising from experience would indicate that the evaluation of programmes can be classified effectively using the judgements described below.

The following three points at least, should be considered:

(i) Acceptable without reservation;
(ii) Acceptable with prescriptions/conditions;
(iii) Unacceptable.

The judgment "acceptable" should be awarded to programmes where all requirements have been fully met, even if improvements are still possible.
The judgment "acceptable with prescription" should be awarded to programmes where requirements have not been fully met, but are judged to be resolvable within a reasonable period of time (as a rule no longer than half the regular full period of accreditation).
The judgment "unacceptable" should be awarded to programmes where requirements have not been met or fully met, and are judged not to be resolvable within a reasonable period of time.

c) The members of the accreditation panel prepare an accreditation report. The accreditation report, without the recommendation, is then submitted to the HEI to check for factual errors and to submit a statement on the report. The statement of the HEI is transmitted to the members of the accreditation panel for review of the accreditation report and the finalisation of the recommendation concerning the accreditation decision.

6. Final Recommendation

In accordance with Section 5 above the following final recommendations should be used. It is recognised that individual agencies may add other types of recommendation, for example, where partial accreditation will result in the cancelation of a degree programme.

6.1 "Accreditation without reservation", with possible specification of recommendations for the improvement of the programme, should be awarded to programmes for which all the requirements are judged to be acceptable. In this case accreditation should be awarded for the full period of accreditation (which should not exceed six years).

6.2 "Accreditation with prescriptions/conditions" and the time in which prescriptions/conditions must be carried out, should be awarded if one or several requirements are judged to be acceptable but with prescriptions/conditions. In such cases accreditation must be awarded for a shorter period of time after which compliance with the prescriptions/conditions must be verified.

6.3 The judgment "unacceptable" should be awarded to programmes where requirements have not been met or fully met, and are judged not to be resolvable within a reasonable period of time. In this case the accreditation panel can recommend that accreditation be withheld.