

Accreditation of European Civil Engineering Programmes

Should ECCE be involved?
If yes, how?

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First testing

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Refinement

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Second testing

11-12, 2005
Wrapping-up, closure

The principal aim was to develop a framework for accreditation of engineering degree programmes in EHEA.

Standards are expressed as programme outcomes:

- ▶ Knowledge and understanding
- ▶ Engineering analysis
- ▶ Engineering design
- ▶ Investigations
- ▶ Engineering practice
- ▶ Transferable skills

Knowledge and understanding

- ▶ The underpinning knowledge and understanding of science, mathematics and engineering fundamentals are essential to satisfying the other programme outcomes. Graduates should demonstrate their knowledge and understanding of their engineering specialization and also of the wider context of engineering.

Knowledge and understanding 1st cycle graduates should have:

- ▶ Knowledge and understanding the scientific and mathematical principles underlying that branch of engineering
- ▶ A systematic understanding of the key aspects and concepts of that branch of engineering
- ▶ Coherent knowledge of that branch of engineering including some forefronts of the branch
- ▶ Awareness of the wider multidisciplinary context of engineering

Knowledge and understanding QUESTIONS

- ▶ Key aspects and key concepts?
- ▶ Forefronts in civil engineering?
- ▶ Multidisciplinary or interdisciplinarity in civil engineering?



Engineering analysis

- ▶ Graduates should be able to solve engineering problems consistent with their level of knowledge and understanding, and which may involve considerations from outside their field of specialisation. Analysis can include the identification of the problem, clarification of the specification, consideration of possible methods of solution, selection of the most appropriate method, and correct implementation. Graduates should be able to use a variety of methods, including mathematical analysis, computational modelling, or practical experiments, and should be able to recognise the importance of societal, health and safety, environmental and commercial constraints.

Engineering Analysis

1st cycle graduates should have:

- ▶ The ability to apply their knowledge and understanding to identify, formulate and solve engineering problems using established methods;
- ▶ The ability to apply their knowledge and understanding to analyse engineering products, processes and methods;
- ▶ The ability to select and apply relevant analytic and modelling methods.

Engineering analysis QUESTIONS

- ▶ Changes and/or additions in 1st cycle curricula to ensure the recognition of the importance of societal, health & safety, environmental and commercial constraints?
- ▶ Arts and Humanities courses? Their weights?



Engineering design

- ▶ Graduates should be able to realise engineering designs consistent with their level of knowledge and understanding, working in cooperation with engineers and non-engineers. The designs may be of devices, processes, methods or artefacts, and the specifications could be wider than technical, including an awareness of societal, health and safety, environmental and commercial considerations.

Engineering Design

1st cycle graduates should have:

- ▶ The ability to apply their knowledge and understanding to develop and realise designs to meet defined and specified requirements;
- ▶ An understanding of design methodologies, and an ability to use them.

Engineering design QUESTIONS

- ▶ Changes or additions in the first cycle curricula to ensure the recognition of the importance of societal, health and safety, environmental and commercial constraints?
- ▶ An appropriate time during the 1st Cycle programme when the design activities should start?
- ▶ First year design?
- ▶ What is your opinion on a civil engineering student being involved in an interdisciplinary design project in which there is no or very little civil engineering component (eg. A solar car, an evacuation algorithm of a town after a natural disaster, an artificial bone design, etc.)
- ▶ Do you think that a capstone design is a must?

Investigations

- ▶ Graduates should be able to use appropriate methods to pursue research or other detailed investigations of technical issues consistent with their level of knowledge and understanding. Investigations may involve literature searches, the design and execution of experiments, the interpretation of data, and computer simulation. They may require that data bases, codes of practice and safety regulations are consulted.

Investigations

1st cycle graduates should have:

- ▶ The ability to conduct searches of literature, and to use data bases and other sources of information;
- ▶ The ability to design and conduct appropriate experiments, interpret data and draw conclusions;
- ▶ Workshop and laboratory skills.

Investigations QUESTIONS

- ▶ Should report writing and term paper writing be a part of civil engineering curriculum?
- ▶ Should written and oral presentation techniques be taught to civil engineering students? Do you think that these require professionals other than civil engineers?

Engineering Practice

- ▶ Graduates should be able to apply their knowledge and understanding to developing practical skills for solving problems, conducting investigations, and designing engineering devices and processes. These skills should include the knowledge, use and limitations of materials, computer modelling, engineering processes, equipment, workshop practice, and technical literature and information sources. They should also recognise the wider, non-technical implications of engineering practice, ethical, environmental, commercial and industrial.

Engineering practice 1st cycle graduates should have:

- ▶ The ability to select and use appropriate equipment, tools and methods;
- ▶ The ability to combine theory and practice to solve engineering problems;
- ▶ An understanding of applicable techniques and methods, and of their limitations;
- ▶ An awareness of the non-technical implications of engineering practice.

Engineering practice QUESTIONS

- ▶ Summer practice time, length, evaluation?
- ▶ CO-OP?
- ▶ Professional ethics as a part of the curriculum?
- ▶ Case studies as a part of the curriculum?

Transferrable Skills

- ▶ The skills necessary for the practice of engineering, and which are applicable more widely, should be developed within the programme.

Transferrable Skills

1st cycle graduates should be able to:

- ▶ Function effectively as an individual and as a member of a team;
- ▶ Use diverse methods to communicate effectively with the engineering community and with society at large;
- ▶ Demonstrate awareness of the health, safety and legal issues and responsibilities of engineering practice, the impact of engineering solutions in a societal and environmental context, and commit to professional ethics, responsibilities and norms of engineering practice;
- ▶ Demonstrate an awareness of project management and business practices, such as risk and change management, and understand their limitations;
- ▶ Recognise the need for, and have the ability to engage in independent, life-long learning.

Should ECCE be involved?

- ▶ A working group within the SC
- ▶ National definitions and understanding of the six standards
- ▶ Current situation in each country
- ▶ Harmonization?
- ▶ Setting the criteria for Civil Engineering education (starting with first cycle)