

Professional Qualifications Some Food for Thought

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Challenges for the debate What Civil Engineering needs, What Civil Engineers need and want?

- ☞ *Adapt to social, scientific and technical development - (i) life today; (ii) Revolution 4.0; (iii) the new concepts for education...*
- ☞ *Ever more holistic education - fundamental knowledge, competences and skills*
- ☞ *Recognition of qualifications - requirement for mobility*
- ☞ *Career Development in a lifelong context*

What we have

- ☞ ***Different Sectoral Qualifications Frameworks***
 - EUR-ACE, ABET, CDIO...
- ☞ ***Different “accords”***
 - Washington Accord, Sydney Accord, Dublin Accord
- ☞ ***Different “registers”***
 - EMF International Register of Professional Engineers
 - ETMF International Register of Engineering Technologists
 - APEC Register of Professional Engineers

Academic Degree Structures in Engineering I - Concerning levels of qualification

- ☞ **Two levels** of qualifications associated to those levels approved in the Directive of Professional Recognition and recognized in the EQF-EHEA and the EQF-LLL
 - **1st Cycle, Level 6 EQF-LLL, Art. 11, d) European Directive: (3-4)U**
 - ✓ **First Cycle Degrees are the basis for achieving the qualification of Technical (or Associate) Engineers, whatever the European designation**
 - **2nd Cycle, Level 7 EQF-LLL, Art. 11, e) European Directive: >= 4U**
 - ✓ **Second Cycle Degrees are the basis for achieving the qualification of Engineers, or equivalent European designation**

Academic Degree Structures in Engineering II - Concerning Profiles

☞ Two main profiles in Engineering

➤ More Theoretically oriented

- ✓ Programmes with a stronger emphasis on basic and engineering sciences in the first years
- ✓ Generally linked to Second Cycle degrees

➤ More Applications oriented

- ✓ Designed to qualify after First Cycle, independently of pursuit of studies through Second Cycles, be it directly or through bridging programmes

Academic Degree Structures in Engineering III - Prevailing concepts in the design of the Degree System

☞ More flexible paths - MORE differentiation (competences) offered

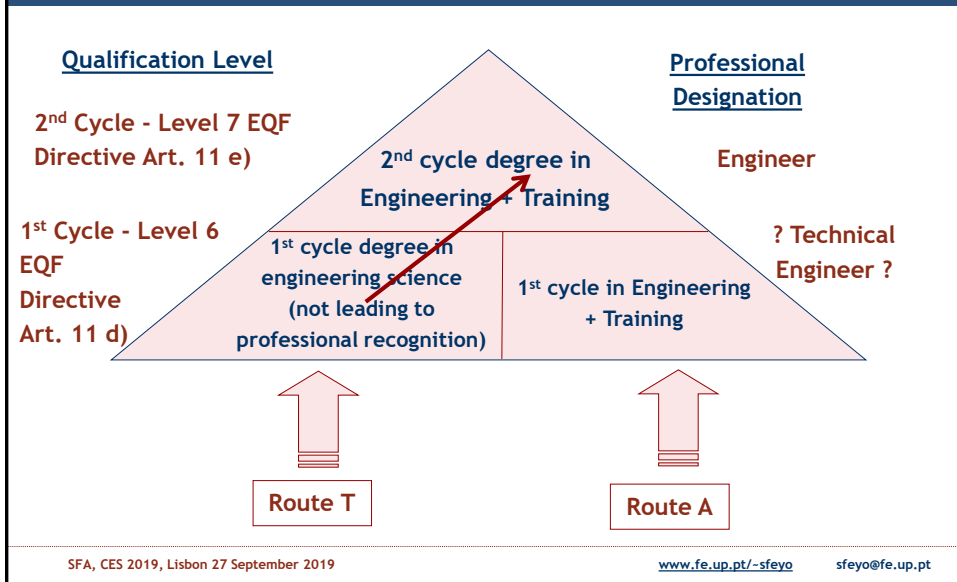
- Either more research oriented, or more innovation oriented, or with a higher entrepreneurial spirit, etc....
- Bringing in the concept of “Communication Pipes” between different profiles of education - Bridging programs

☞ More attractive offer in order to bring into the system students with different backgrounds and interests

☞ Promotion of a true offer for lifelong learning through

- Complementary modules of (advanced) specialization courses
- Implementing the concept of ‘accumulated credits’ for recognition of studies

Academic Degree Structures in Engineering Routes for the different qualification levels



Academic Degrees in Engineering V - Understanding fundamental differences between levels of qualifications

- ☞ Programme Outcomes must be evaluated in relation with the level of intervention in the Engineering Activity
 - Social responsibility (namely, signing projects)
 - Capacity to tackle large, complex problems
 - Capacity to adapt to new jobs of high complexity and responsibility
 - Capacity for effective activity in the production line
 -
- ☞ For the different subsets of Programme Outcomes, and for the First and Second Cycle Degrees in Engineering, the differences in outcomes are mostly related with
 - scope, depth and breadth
- ☞ For the Master degree, developing the right **ATTITUDE** to use knowledge or skills in a given situation is a major outcome

Academic Degree Structures in Engineering VI - Is there a trend?

☞ In www.ieee.org/theinstitute

M. Kam & A. Peskin, "What Should be the First Professional Degree in Engineering?", p.10-11, September 2007

We can read

"...In the United States the National Academy of Engineering and the American Society of Civil Engineers have advocated that the Master of Science be declared the first professional degree in Engineering" .

AN OLD MAJOR QUESTION (I)

M. Kam & A. Peskin, "What Should be the First Professional Degree in Engineering?", IEEE, p.10-11, September 2007, www.ieee.org/theinstitute

EDUCATION

What Should Be the First Professional Degree in Engineering?

BY MOSHE KAM & ARNOLD PESKIN

We'd like your opinion. Should the first professional degree in engineering be at the Bachelor or Master level?

The IEEE is considering whether to follow the recommendations of several other professional bodies and declare that a Master of Science or Master of Engineering (rather than Bachelor-level degrees) should be an engi-

first professional degree in engineering is the customary degree needed for the practice of engineering. Practice is understood to be carried out in an industrial setting, and does not require much additional training.

However, it is widely accepted that in a field as large and diverse as engineering, some specialties require more training. For example, researchers and academ-

gineering is the Bachelor of Science or Bachelor of Engineering. In the last decade, some educational programs that required more schooling or practice (and awarded a title such as Diplom-engineer) have reduced their requirements to conform to the B.Sc./B.Eng. "standard." Nevertheless, the increasing complexity of engineering tasks motivated educators to add new topics and subdisciplines to

AN OLD MAJOR QUESTION (II)

M. Kam & A. Peskin, "What Should be the First Professional Degree in Engineering?",
IEEE, p.10-11, September 2007

EDUCATION

normally require two additional years of study and a dissertation.

In the United States, the National Academy

of Engineering and the American Society of Civil Engineers have advocated that the Master of Science be declared the first profes-

sional degree in engineering. The U.S. National Council of Examiners for Engineering and Surveying recently discussed changes to its Model

Law requiring a Bachelor of Science degree plus 30 semester credits as a prerequisite for candidacy for licensure. The tables presented here:

Issue and Design program on this table

The First Professional Degree in Engineering

Question	Current Practice	Proposed
What should be the minimum requirement?	A Bachelor of Science in engineering (or equivalent)	A Master of Science in engineering or a Bachelor of Science in engineering plus 30 additional semester credits
What additional training would be required?	None	Holders of a B.Sc. or B.Eng. would have to acquire additional educational credentials such as a M.Sc. or M.Eng.
What changes in engineering education would be needed?	None	New accreditation procedures for graduate programs; development of new graduate curricula; changes in licensure procedures and laws.
Who supports each position?	Inside the IEEE, several sections, including the Alaska Section. In the United States, several representatives of state licensing boards that do not intend to adopt new guidelines.	Several engineering associations including the American Society of Civil Engineers. In the United States, the National Academy of Engineering and National Council of Examiners for Engineering and Surveying. In Europe, the developers of the Bologna Process.

Key: IEEE and Act Plus

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