

**EurAgEng 2018 conference from 8 - 12 July 2018, Wageningen, the Netherlands**  
**New engineering concepts for a valued agriculture**

# **Harmonisation of Higher Education in Agricultural/Biosystems Engineering**

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# History of the degree study programs in Agricultural/Biosystems Engineering

The international harmonisation of the Higher Education Area (HEA) in Agricultural/Biosystems Engineering (ABE) was started by Prof. Giuseppe Pellizzi during the CIGR 1989 Conference.

This action was carried out in the EU by EurAgEng SIG RD12 - Education and Communication (Chairman Prof. Pierluigi Febo from 1994) and also elsewhere by CIGR WG1 - Agricultural Engineering University Curricula Harmonization (Chairman Prof. Pierluigi Febo from 1994 and Secretary Dr. Antonio Comparetti from 2007).

The book and CD-ROM “The University Structure and Curricula on Agricultural Engineering. An overview of 36 countries” were presented by Prof. Pierluigi Febo during the AgEng 2000 Conference, held in Warwick (UK).

# Thematic networks on the degree study programs in Agricultural/Biosystems Engineering

4 thematic networks followed :

- 1) USAEE-TN (University Studies of Agricultural Engineering in Europe - A Thematic Network);
- 2) Consortium POMSEBES (Policy Oriented Measures in Support of the Evolving Biosystems Engineering Studies in USA - EU);
- 3) ERABEE-TN (Education and Research in Biosystems Engineering in Europe - A Thematic Network);
- 4) Consortium TABE.NET (Trans-Atlantic Biosystems Engineering Curriculum and Mobility).



# USAEE-TN

The main objectives of USAEE-TN (University Studies of Agricultural Engineering in Europe - A Thematic Network), comprising 31 institutions from 27 Countries, from 2002 to 2006, were to :

- 1) define and develop core curricula of 1<sup>st</sup> and 2<sup>nd</sup> cycles, to be used as benchmarks for Agricultural Engineering studies in Europe;
- 2) determine a set of minimum criteria/requirements, against which any curriculum can be tested, in order to decide whether it meets these criteria/requisites and, therefore, can be recognised as a program in Agricultural Engineering;
- 3) define common accreditation procedures, also in terms of European Credit Transfer System (ECTS) credits, and establish the bodies/committees for carrying out these procedures.

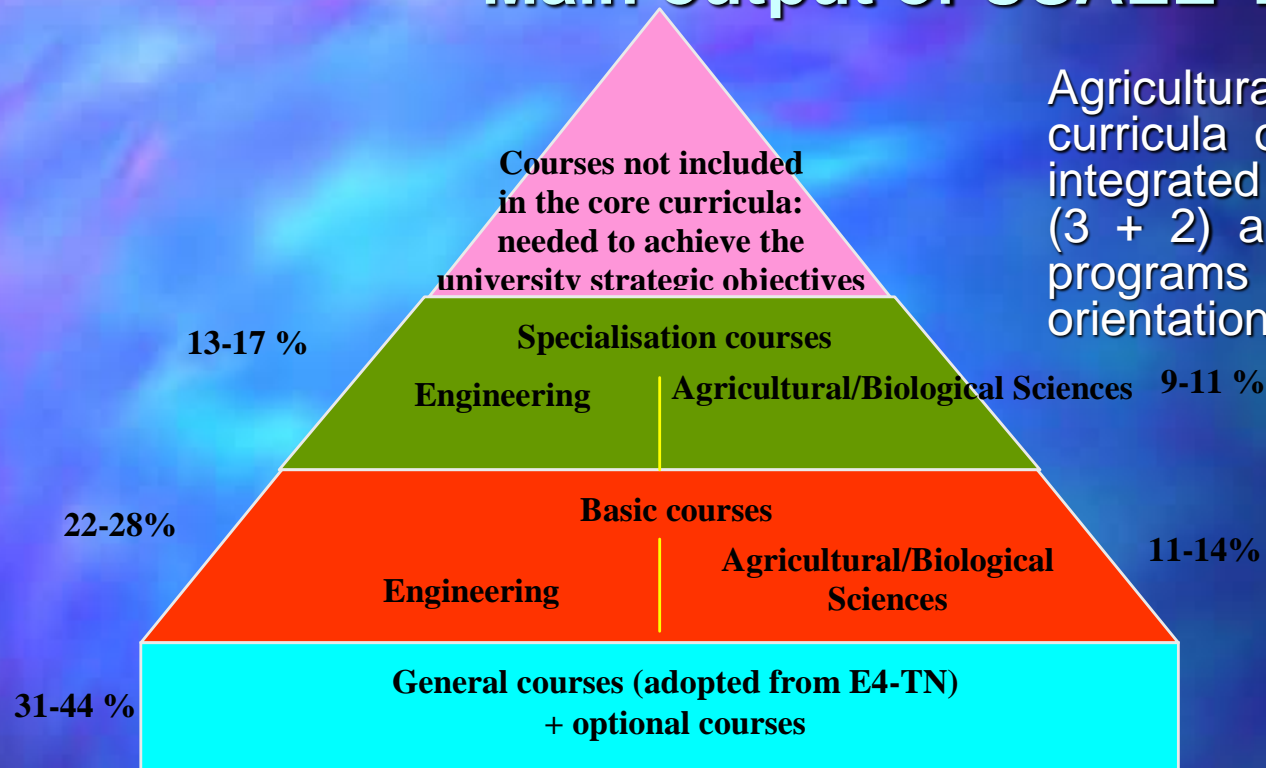
In the first step of the development of Agricultural Engineering core curricula, the 1<sup>st</sup> study cycle was examined and 2 different schemes were defined and focused in a draft report.

Scheme A, with academic orientation, consists of :

- 1) core curricula of integrated 5-year degree study programs (M.Sc.);
- 2) core curricula of “pivot-point” 1<sup>st</sup> cycle 3-year degree study programs (B.Sc.).

Scheme B, with application-technological orientation, is represented by the core curricula of professional 1<sup>st</sup> cycle (mostly 3-year) degree study programs.

# Main output of USAEE-TN



Agricultural Engineering core curricula of 1<sup>st</sup> cycle “pivot point” integrated degree study programs (3 + 2) and 5-year degree study programs with academic orientation.

This report also includes 7 modules or specialisations in Agricultural Engineering :

- 1) Water Resources Engineering;
- 2) Mechanical Systems and Mechanisms used in Agricultural and Bioprocess Engineering (Tables 1 and 2);
- 3) Structural Systems and Materials in Agricultural and Bioprocess Engineering;
- 4) Waste Management in Agricultural and Bioprocess Engineering;
- 5) Bioprocessing;
- 6) Energy Supply and Management in Agricultural and Bioprocess Engineering;
- 7) Information Technology and Automation in Agricultural and Bioprocess Engineering.



# Consortium POMSEBES

The achieved objectives of Consortium POMSEBES (Policy Oriented Measures in Support of the Evolving Biosystems Engineering Studies in USA - EU), comprising 8 EU and 4 USA institutions, from 2006 to 2008, were to :

- 1) provide a platform for a systematic exchange of experiences and ideas between the USA and the EU, in order to contribute to the enhancement of the quality and linkage of research and education and to establish appropriate policy oriented measures, i.e. the development of Biosystems Engineering study programs including strong basic Engineering courses/topics and disseminating these courses into other study programs in (Applied) Biological Sciences, in order to open Engineering concepts to the appropriate students;
- 2) develop appropriate degree study programs in Biosystems Engineering, whereas the relationship between the quality of these curricula and the learning outcomes and core abilities of students can be established and encouraged by EUR-ACE (Accreditation of European Engineering Programmes and Graduates) in the EU and ABET (Accreditation Board for Engineering and Technology) in the USA, respectively;
- 3) encourage compatible study programs, within the EU as well as between the EU and the USA, through a systematic comparison of curricula, aimed at a standard definition of basic courses, clarification of areas of application and a common definition of student course load.

# ERABEE-TN

The main achieved objectives of ERABEE-TN (Education and Research in Biosystems Engineering in Europe - A Thematic Network), comprising 35 institutions from 27 Countries, from 2007 to 2010, were to :

- 1) define the emerging Biosystems Engineering discipline in Europe, by describing the current situation;
- 2) describe the current situation and perspectives of the development of Biosystems Engineering study programs towards the areas of bio-fuels, bio-materials and quality of products;
- 3) describe the current schemes and the possible structured study programs of the 3<sup>rd</sup> cycle University studies in Agricultural Engineering and in the emerging discipline of Biosystems Engineering;
- 4) describe the research activities in the first two cycles of Biosystems Engineering University studies;
- 5) describe the infrastructures for the quality assessment and accreditation of Biosystems Engineering University studies;
- 6) describe the tools for enhancing the attractiveness of European study programs in Biosystems Engineering.



# Consortium TABE.NET

The objectives of Consortium TABE.NET (Trans-Atlantic Biosystems Engineering Curriculum and Mobility), comprising 4 EU and 2 USA institutions, from 2009 to 2013, were to :

- 1) define the common threads within the discipline of Biosystems Engineering;
- 2) globalise core Biosystems Engineering courses by creating a database of multinational examples that can be drawn upon by instructors around the world;
- 3) develop innovative courses to advance the continuing development of Biosystems Engineering programs in the US and EU (and globally);
- 4) design student and staff/faculty mobility experiences that enhance the global perspectives of both;
- 5) create a cohort of students aware of and able to work in a global employment market.



## Major outcomes of the thematic networks on Agricultural/Biosystems Engineering degree study programs

The major outcomes were to :

- define and develop core curricula of 1<sup>st</sup> and 2<sup>nd</sup> cycles, to be used as benchmarks for degree study programs in Agricultural Engineering in Europe (USAEE-TN);
- develop a web-based database including the courses or modules of the above study programs, in order to facilitate recognition of the core curricula and, therefore, promote student mobility in the EU (USAEE-TN);
- perform studies on accreditation procedures of the above degree programs in the EU (USAEE-TN);
- perform studies on the transition of curricula from traditional Agricultural Engineering to the broader Biosystems Engineering (ERABEE-TN);
- establish the recognition procedures of new European study programs in Biosystems Engineering by FEANI and EurAgEng, based on the core curricula developed by USAEE-TN (ERABEE-TN);
- promote the mobility of researchers and students within the EU, as a consequence of the development of compatible study programs in Biosystems Engineering and the enhancement of their attractiveness (ERABEE-TN);
- define and develop 11 Agricultural/Biosystems Engineering degree study programs, satisfying FEANI (European Federation of National Associations of Engineers) and EurAgEng criteria, in the EU (ERABEE-TN).

# What will the future of Higher Education in Agricultural/Biosystems Engineering be ?

At present the harmonisation process of Agricultural/Biosystems Engineering degree study programs in Europe benefits from the results of the projects of USAEE and ERABEE thematic networks.

Other important contributions towards the harmonisation of the European curricula in Agricultural/Biosystems Engineering were achieved through the cooperation between EU and US Higher Education Area institutions, during the projects of POMSEBES consortium and TABE.NET one.

However, the above process is still in progress and will be also performed through the dissemination activities of ERABEE-TN and future projects, which will be submitted to the EU by the partners of this network.



Grazie !

Thank you !

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