Harmonisation in Biomedical Engineering Education

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Biomedical Engineering is a dynamic field undergoing rapid evolution over the last decades.
The Medical Device Industry Today

The global medical device market is estimated to be more than 300 Billion Euros in year 2016, with more than 500,000 medical technologies registered.

Medical technology industry is one of Europe's most diverse and innovative high-tech sectors, with 25,000 medical technology companies that provide over 575,000 jobs in Europe.

Covers almost 1/3 of the world production

€100B

10,000 patents are registered every year in Europe
BIOMEDICAL ENGINEERS are involved in the whole Medical Devices (MDs) life cycle.
In the past decades, biomedical engineering has been expanding so rapidly and broadly that practically no University in the world can offer programs covering all areas of BME.
The European harmonization approach

The Bologna Declaration

Signed by the Ministers of Education of the EU states, it established the framework of a common European higher education system.

European Higher Education Area (EHEA)
5 years of studies for graduation

3+2 years scheme (1st + 2nd cycle)

OR

one 5-year cycle for engineers leading directly to a 2nd level degree
These programs supported the mobility of

thousands of teachers

hundreds of thousands of students

over the last 25 years
Under the MELETI project and in collaboration with the International Federation for Medical and Biological Engineering (IFMBE), a survey was conducted to map the BME study programs in the EU countries.

**YEAR 2000**

50 Universities were delivering a program in the field of BME.

- **26** BME undergraduate programs
- **30** BME postgraduate programs

40% Only 20 Universities were applying the ECTS

58% 29 Institutions were applying Quality Assessment schemes

74% 37 reported a follow-up of the educational process by means of student opinion surveys

40% 20 used external evaluation
A second survey carried out in 2012 within the CRH-BME Project revealed over 350 BME study programs in Europe, with the 2nd cycle (MSc level) programs dominating.

In 40 countries covered by this study it was found that:

- More than 150 Universities across Europe
- 350 BME programs

- 55% MSc Degrees
- 20% PhD Degrees
- 85% Only full time learning programs

It is important to notice that The 70% of the BME programs have been created after the year 2000, while new programs are constantly added to the list.
1989

A multinational postgraduate program in Biomedical Engineering was launched

University of Patras, Greece
University of Patras, Greece

EU Universities: 50
Students from more than 10 European countries:
more than 250 students from abroad came to Patras to study at this program
more than 25 teachers from abroad participated

Ran for 25 Years: 1989 - 2014
Curriculum model

Master’s Thesis

equivalent to 30 credits

400 hrs
spread in two semesters

equivalent to 60 credits
The corresponding lectures were delivered in blocks (in short periods), lasting from one to three weeks, thus allowing visiting teachers to fit this task to their agenda.

The program also encouraged the students to perform their MSc thesis abroad during the last semester.

On average, half of the students used this fruitful way to fulfil the thesis requirements and transfer the credits to their home University that finally awarded their degree.
The program was one of the first in Europe to implement the ECTS and the joint degree approach bringing together one Medical school at the UPAT and two Engineering Schools at the National Technical University of Athens.
EU funded projects coordinated by BITU/UPAT

- Tempus GR – RO
- Tempus GR – BG
- TEMPERE
- MELETI
- Tempus CRH – BME
- Tempus BME – ENA
The Tempus IV CRH-BME “Curricula Reformation and Harmonization in the field of Biomedical Engineering” project, coordinated by BITU/UPAT, aimed to create guidelines for updating existing BME curricula in Europe and to propose an updated generic curriculum in the field of BME.

FIVE DISTINCT GENERIC TYPES OF BME PROGRAMS

1. 1st cycle BME program (for employment)
2. Integrated 1st & 2nd cycle BME program
3. Stand-alone 2nd cycle BME program (entry from 1st cycle BME program)
4. Stand-alone 2nd cycle BME program (entry from 1st cycle engineering (non-BME))
5. Stand-alone 2nd cycle BME program (entry from 1st cycle medical or biological program)
Extending BME education harmonization on the eastern European Neighbouring Area (ENA)

The BME – ENA Project
The considerable number of R&D projects funded by EU and National Programs & Institute of Biomedical Technology (INBIT) greatly contributed to the success of this program by providing funds, staff and facilities for the students to gain experience on the field.
EDUCATIONAL PROJECTS AND ACTIVITIES

R&D PROJECTS AND ACTIVITIES
THANK YOU

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