CONTINUING ENGINEERING EDUCATION – THE EXPERIENCE OF FEUP

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Abstract *— The Faculty of Engineering is the largest of the University of Porto with around 7000 students, over 500 of them in doctoral programs. FEUP has almost 500 teaching staff (77% with PhD). FEUP offers education programmes at various levels: 3 undergraduate, 17 master, 13 PhD, 4 specializations and advanced studies and 40 lifelong learning units. Besides teaching and research, continuing education has become a crucial part of the third mission of the university. Lifelong learning is one of the higher education priorities for the next decade. FEUP has been actively engaged in Continuing Engineering Education, providing opportunities for professional development in a wide range of Engineering areas, such as those related with new European codes of practice, entrepreneurship, management and executive training. FEUP has also invested heavily in the personal and pedagogic development of its teaching staff.*

Index Terms — Bologna Process, continuing engineering education, lifelong learning, professional development.

INTRODUCTION

Lifelong learning has been recognized as an increasingly fundamental component of the so called Third Mission of the University, besides Teaching and Research. In the Leuven Conference of the Higher Education Ministers of the 46 Bologna Process countries (April 2009), lifelong learning was nominated as one of the priorities in this area for the coming decade [1].

The Portuguese legal framework of higher education has been changing since 2006, with the creation of formal conditions to attract a wider public, with the recognition and validation of prior learning, complemented by the offer of more flexible learning paths and the possibility to accumulate and transfer credits.

It is in this Bologna inspired context that FEUP creates in June 2009 the Lifelong Learning Office (LLO), with the aim of contributing to promote and widen the offer of continuing education to engineering professionals. The objective of the LLO is to make the teaching and training expertise of FEUP available to the development of professionals in all engineering areas.

This may be achieved either by the offer of disciplines or groups of disciplines selected from the curricula of FEUP degree courses or by training courses taken from the lifelong learning catalogue or , if required, made to measure to suit specific company requirements. Examples are given below.

LIFELONG LEARNING COURSE CATALOGUE

The lifelong learning courses currently offered by FEUP for the first semester of 2010 are listed in Table I.

TABLE I
LIFELONG LEARNING COURSE CATALOGUE

Biomedical Engineering	Hours / Credits
Biomedical Image Analysis	62 / 5
Materials Science in Bioengineering	135 / 5
Process Control and Instrumentation	135 / 5
Bioreaction Engineering	56 / 6
Protein Engineering	162 / 6
Electricity and Energy	**Hours / Credits**
Decision, Optimization and Computational Intelligence	56 / 6
Ergonomy and Occupational Health	- / 6
Markets and Quality	160 / 6
Models and Prototypes	162 / 6
Licensing Project	274 / 7
Electronics and Automation	**Hours / Credits**
Architecture of Software Systems	42 / 6
Automation	160 / 6
Mobile Communication	162 / 6
Optical Communication	162 / 6
Automobile Electronics	160 / 6
Software System Engineering Requirements	152 / 6
Multimedia Laboratory	160 / 6
Markup Languages and Document Processing	162 / 6
VSLI Circuit Design	165 / 6
Pattern Recognition	160 / 6
Industrial Robotics	162 / 6
Radio Communication Systems	56 / 6
Automation Technologies	175.5 / 6.5
Database Technologies	125 / 5
Distribution and Integration Technologies	172 / 6
e-Business Tecnologies	39 / 6
Metallurgy and Materials	**Hours / Credits**
Biomaterials	60 / 4
Material Selectiont	56 / 6
Business Science	**Hours / Credits**
Innovation and Entrepreneurship	162 / 6
Environmental Protection	**Hours / Credits**
Environmental Acoustics	135 / 5
Environmental Decision Tools	52 / 6
Hydraulics and River Rehabilitation	24 / -
Safety Services	**Hours / Credits**
Road Safety in Urban and PeriUrban Environment	147 / 5
Environmental Decision Tools	52 / 6

COURSE UNITS

With Bologna a professional may choose a course unit or select a group of units according to his needs.

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For the purpose of illustrating this possibility in Table II are listed the course units made available by the Civil Engineering Department in the current academic year.

TABLE II
CIVIL ENGINEERING

Construction Engineering
Construction Management
Installations in Buildings
Thermics of Buildings
Design Review and Checking
Construction Control
Construction System Technologies
Environmental and Building Acoustics
Building Pathology and Rehabilitation
Quality in Construction
Retaining Walls and Foundations in Buildings
Maintenance and Rehabilitation of Buildings
Fire Safety in Buildings
Masonry Construction Technologies
Structural Engineering
Advanced Structural Analysis
Structural Dynamics and Earthquake Engineering
Steel and Composite Structures
Prestressed Structures
Foundations and Retaining Structures
Bridges
Geotechnical Engineering
Earth Retaining Structures
Foundations
Numerical Methods in Geotechnics
Models and Safety in Geotechnics
Embankment Works
Underground Works
Hydraulic Engineering
Fluvial Works and Hydroplants
Water Supply Systems
Urban Drainage Systems
Maritime Works
Construction Materials Engineering
Geosynthetics
New Construction Materials
Construction Monitoring and Observation
Materials Pathologies
Prefabrication
Construction Processes
Planning Engineering
Urban Management
Planning and Management of Mobility
Planning and Environmental Quality
Regional Planning
Urban Planning
Transportation Systems
Transport Infrastructure Engineering
Railways
Traffic and Transports
Roads and Airports
Roadworks
Pavements

ADVANCED STUDY COURSES

The Advanced Study courses are at 3rd cycle level (Doctoral Studies) and have over 30 credits.

The courses currently on offer are listed in Table III.

TABLE III
ADVANCED STUDY COURSES

Innovation and Product Engineering
Building Rehabilitation
Sustainable Energy Systems

SPECIALIZATION COURSES

The Specialization courses are at 2nd cycle level (Master Studies) with morethan 30 credits. The courses currently on offer are listed in Table IV.

TABLE IV
SPECIALIZATION COURSES

Technological Entrepreneurship and Sustainability
Technological Entrepreneurship in Occupational Health

UPDATE COURSES

Update courses are training opportunities comprising less than 30 credits that do not confer a degree but are at the same level of first, second or third cycle studies. Aiming to foster lifelong learning, these opportunities offer specific training, promoting the student's personal and professional development. This type of training encompasses several goals, such as perfecting personal and professional skills, updating knowledge and enabling specialization. The courses currently offered are listed in Table V.

TABLE V
UPDATE COURSES

Innovation Processes
Hydraulics and River Rehabilitation
Innovation and Entrepreneurship

EXPERT QUALIFICATION COURSES

Courses are offered for the qualification of experts for the energetic certification and climatization of buildings, mostly directed to Civil and Mechanical Engineers as well as Architects.

FINAL REMARKS

The lifelong learning alternatives available at FEUP have been briefly presented.

REFERENCES

[1] http://www.ond.vlaanderen.be/hogeronderwijs/bologna/conference/documents/Leuven_Louvain-la-Neuve_Communiqué_April_2009.pdf , pp.6 (accessed in February 2010).

[2] https://www.fe.up.pt/si/conteudos_geral.conteudos_ver?pct_pag_id=12129&pct_parametros=p_ano=2009&pct_disciplina=&pct_grupo=22168&pct_grupo=22250