The progress of the study branch Biomedical Technology at VSB Technical University Ostrava via the European Social Fund

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Abstract – **In 2003 the new bachelor program Biomedical Technology has been accredited at VSB Technical University Ostrava in the Czech Republic. One year later, in 2004, the new ACT No.96/2004 COLL. on Paramedical Professions has defined the conditions for the obtaining of qualifications for pursuing paramedical professions. In 2005, in the new decree No. 39/2005 COLL. the minimal requirements on the study programs for obtaining professional qualification for performance of a paramedical health-care profession have been specified. To realize the necessary modifications in the curricula the university applied for a support via the European Social Fund project. The global goal of the project is the advancement of the study field Biomedical Technology with long-term perspective of better employability of its student on both on the Czech end EU labor market. The specific measures of the project are realized within three main key activities: The change of the structure and contents of particular classes with emphasis on practical part of the subjects, The realization of the new mood of guidance of practical training in hospital by mentors and The production of good-class set of study materials to cover both technical end medical part of the study program.**

Index Terms – Biomedical Engineering, European Social Fund, Health Care Legislation, Bachelor study program, Professional Qualification.

INTRODUCTION

Biomedical engineering, clinical engineering and medical informatics represent interdisciplinary branches which are very progressive and acknowledged and which intervene into many spheres. The mentioned branches apply various technical principles and skills in biology and medicine: from proposals, construction and implementation, to servicing of medical technology.

So the new bachelor study branch "Biomedical technician" has been proposed and accredited at the Faculty of Electrical Engineering and Computer Science of the VSB Technical University Ostrava in 2003 [3]. There was a previous experience with minor biomedical engineering program realized within the master's program Measurement and Control during the period of more then 10 years.

However new act [1] which appeared in 2004 raised the need to change the structure of the new biomedical curricula and also to modify the conception of some classes to better cover the defined requirements.

The new "*ACT No.96/2004 COLL. on the Conditions for the Obtaining and Recognition of Qualifications for Pursuing Paramedical professions and for Carrying out Activities in Connection with the Provision of Health Care and on the Amendments of Some of the Related Acts (Act on Paramedical Professions)*" defines, for the first time, the term lifelong learning in healthcare and exchanged activities, which are perceived as lifelong education. The Act governs also the conditions for the obtaining of qualifications for pursuing paramedical professions and for carrying out activities related to the provision of health care.

These requirements are more accurately defined in Decree No. 39/2005 Coll.[2], stipulating the minimal requirements on the study programs for obtaining professional qualification for performance of a paramedical health-care profession.

This Decree incorporates the relevant regulations of the European Communities and provides for the minimal requirements on the study programs, the study of which results in professional qualification for performance of a paramedical health-care profession; these minimum requirements constitute a list of the theoretical and practical fields necessary for performance of regulated activities.

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HEALTH CARE LEGISLATION ON PROFESSIONAL QUALIFICATIONS

In this decree the Professional Qualifications for Pursuing the Profession of Biomedical Technician are defined as follows:

(1) Professional qualification to perform the profession of biomedical technician shall be obtained by completing a certified study program or certified study program and educational program of a course or certified educational program and educational program of a course.

(2) The programs mentioned in paragraph 1 shall have a total standard period of study of at least 3 years, of which practical training shall last at least 600 hours.

(3) Study in the programs mentioned in paragraph shall contain

*a) **theoretical teaching** providing knowledge in*

fields that form the basis necessary for performance of a technical medical profession, on the basis of anatomy, physiology and pathology,

technical fields, i.e. in the processing of signals and images (introduction to the theory of signal processing, analysis and interpretation of biosignals, biomedical sensors), in medical apparatuses (fundamentals of electrical circuits, diagnostic medical apparatuses, therapeutical medical apparatuses, laboratory medical apparatuses, complexes of medical apparatuses, imaging systems in clinical practice), in computer science and cybernetics (fundamentals of statistics in medicine, computer support for diagnostics, telemedicine, information systems in medical care, introduction to the theory of simulation and modelling), electrotechnical subjects (mathematics, physics, theoretical electrotechnology, electronics, electrical measurements, programming),

related fields, i.e. in management of medical technology, in technical legal regulations and standards valid in medical care and in the fundamentals of the methodology of scientific research,

*b**) practical training** providing skills and knowledge in the fields mentioned in previous subparagraph*

Practical training shall take place in school laboratories and in medical facilities; practical training in medical facilities shall include at least 50 hours at workplaces employing diagnostic medical apparatuses, at least 30 hours at workplaces employing therapeutical medical apparatuses and at least 20 hours at workplaces employing laboratory medical apparatuses.

If professional qualification for performance of the profession of biomedical technician is obtained through study in a certified study program and educational program of a course or in a certified educational program and educational program of a course, the educational program shall be supplemented by a course of education obtained by completing a certified study program or certified educational program so as to comply with the requirements pursuant to paragraphs 2 and 3.

To realize the necessary changes elicited by the mentioned legislative documents the faculty applied for a support to cover expenses combined with such reconstruction at the grant agency of The Ministry of Education Youth and Sports for the European Social Fund (ESF) via the project "Advancement of the study branch Biomedical technology and of employability of its graduates on the employment market in reference to Act. Nor 96/2004 CALL"

THE EUROPEAN SOCIAL FUND

The European Social Fund (ESF) helps people improve their skills and, consequently, their job prospects. The ESF is the EU's main source of financial support for efforts to develop employability and human resources. It helps Member States combat unemployment, prevent people from dropping out of the labor market, and promote training to make Europe's workforce and companies better equipped to face new, global challenges

In the Czech Republic one branch of ESF is focused on the following important activities

- Training in the fields of research, science and technology
- Development and improvement of training, education and skills acquisition, including the training of teachers
- Development of systems for anticipating changes in employment and in qualification needs

THE PROJECT "ADVANCEMENT OF THE STUDY BRANCH BIOMEDICAL TECHNOLOGY…"

From general point of view the global goal of the project is the advancement of study field Biomedical Technology with long-term perspective of better employability of its student on both on the Czech end EU labor market. The specific measures are realized within three key activities :

- The change of the structure and contents of particular classes with emphasis on practical part of the subjects
- The realization of the new mode of guidance of practical training in hospital by mentors
- The production of good-class set of study materials to cover both technical end medical part of the study program

The implementation of the key activities is scheduled to a period of two years with finalization in October 2007. Now the classes, both theoretical and practical, are taught by two universities; by the Faculty of Electrical Engineering and Computer Science at VŠB-Technical University Ostrava and by the Medico-Social Faculty of the University of Ostrava.

The **Faculty of Electrical Engineering and Computer Science**, makes up 70% of total hours and provides technical and language classes with the exception of Latin. Among the required classes are Math I and II, Physics, Optical Electronics, Biophysics, Electrical Circuits, Signal Analysis, Basic Computer Skills, Measurement and Processing of Data, Information Systems in Healthcare, Sensors in Biomedicine, Electronic Instruments technique, Electronic Instruments Measurement and Monitoring and Control Systems.

Another class that is required that belongs to two semester practical classes is the Healthcare Electronic Equipment class that consists of basic and specialized healthcare technique, including its clinical application according to individual medical fields. The Department of Measurement and Control offers also optional courses in Biocybernetics and Biotelemetry**.**

The **Medico-Social Faculty** provides required classes in healthcare such as First Aid, Basics of Anatomy, Physiology, Pathology, Psychology, Chemistry and Biology, Work Hygiene and Epidemiology, Microbiology and Immunology. Also included in the required courses are Ethics in Healthcare, Management and Operations in Healthcare, Healthcare Law, Marketing in Healthcare, Public Healthcare, Security, and Latin and Specialized Terminology.

Other required classes are courses focused on practical therapeutic and diagnostic technique. In this area are included classes such as Clinical Propedeutics, Technique in Diagnostic Sickness in Internal and Surgery Sectors, Healing Technique in Radiotherapy and Nuclear Medicine in Healthcare Equipment. Furthermore, the Medico-Social faculty offers optional courses such as Audiometry, Rehabilitation Methods and Technique, Equipment Technique and Compensation Aids for the Handicapped, Examining Methods and Equipment Technique in Optometry, Civilization Diseases and Physical Body Workload Risks.

A very important part of the program is the related specialized workplace classes taken place at healthcare clinics that make up 120 hours, which over qualifies the norms according to the decree 39/2005. In their first year, students complete 7 daily practical classes in the area of **Management and Operation of the Hospitals** and in the second year, they complete 14 full day practical classes according to the requirements of the decree 39/2005. In this area the **Faculty Hospital** of Ostrava-Poruba, **Town Hospital of Ostrava** and in smaller extent also in hospitals around the Ostrava are providing excellent groundwork and support for the program.

Statistics that are more detailed (number of credits and hours taught) in relation to the healthcare and technical courses of the BMT program are shown in the following table, TABLE I.

TABLE I
TABLE OF SKILLS IN SUBJECT REPRESENTATION ACCORDING YEAR, HOURS AND PERCENTS

	Electrical (Technical)		**Health (Humanity)**		**Others specialized subjects**	
Yr.	Hrs.	Lect./ exerc.	Hrs.	Lect./ exerc.	Hrs.	Lect./ exerc.
1	476	252/224	294	168/126	70	42/28
2	448	252/196	196	140/56	56	42/14
3	209	77/132	242	110/132	44	44/0
∑	1133	581/552	732	418/314	170	128/42
%	48,8	24/23,8	31,5	18/13,5	7,2	5,4/1,8

The Biomedical Technology inter-disciplinary program was commenced in the school year of 2004/2005. Now there are together about 90 students in three year-classes of the BMT field.

THE RESULTS OF THE PROJECT

The key activities of the project are realized in cooperation with two project partners which are Medico-Social Faculty of University of Ostrava and Akord company - the producer of medical software.

- People from Akord company developed an Educational Hospital Information System (EHIS) which is a modification of their own professional system installed in many hospitals in the Czech Republic. The EHIS system is used as a platform for practical training in the subject Healthcare Information Systems. The functionality of the educational system is almost the same as of its professional variant however it is better accommodated to educational purposes-
- The new laboratory for biomedical engineering has been furnished with new equipment: computers, healthcare software, modular electronic kit for teaching basics of electronics and other subjects where electronics represents substantial part.
- A new system for practical training in medical facilities was designed according to the system used by Medico-Social Faculty for practical training for nurses.
- On the date 30th April twenty titles of the new lecture notes has been written and printed and fifteen another lecture notes is supposed to be printed until the end of October 2007 when project terminates.
- About twenty new laboratory assignments and projects has been created and incorporated into the running classes.

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