

STANDARDS FOR PROFESSIONAL TRAINING OF ENGINEERS IN THE REPUBLIC OF MOLDOVA

**Are educational standards really necessary for university education?
If so, what should their structure and content be?
What general and specific features an engineering training is about?
To what extent the matter of standards fits into the objectives of Bologna process?**

Assurance of a credible education, corresponding to the requirements of present labor market, is supposed to be achieved through the accreditation of educational programs done by competent state bodies. The accreditation is meant to prove that university performs quality work. An objective approach of the process of accreditation is possible only if there exists a document stipulating a standard situation (requirements and results) applied to all elements necessary for the training of a specialist. As such may serve the Standard for professional training of a specialist, determining cognitive and relevant results for a specific professional qualification.

The above statement fully corresponds to the objectives of Bologna process.

TUM developed Standards for engineering specialties in collaboration with respective ministries and other organizations operating in the respective area.

The Standard can be developed for either profile training or for any specialization. The first option is most attractive for us given the following aspects:

- the common structure of didactic requirements and activities is explicitly determined;
- overall basic engineering training at the first university stage with a clear specialization at the second stage and postgraduate studies;
- gradual transition toward generalist training, corresponding to actual tendencies on the labor market.

Presently it was considered appropriate that in terms of transition period the national university education is passing at the moment, the standard should contain three basic elements:

1. Requirements for the competence of the specialist holding higher education diploma in the profile envisaged (the fundamental part of the standard);
2. Minimal requirements for the content of education (curricular standard);
3. Minimal requirements for didactic and methodic support of the education process.

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Requirements for the competence of the specialist holding higher education diploma.

The requirements of the Standard are divided into two large groups:

- General requirements for specialists holding higher education diploma. These requirements result from the general objectives of Moldovan higher education.
- The second group includes professional requirements specific to a certain profile.

The program for engineer training should develop the abilities for the application of the respective knowledge in the engineering practice in an efficient professional manner. I mean the following:

- Capability to highlight and solve practically

the problems of the society which is deeply influenced by engineering education;

- Sensibility to technical problems with social effects encountered by the profession;
- Awareness of ethical characteristics of the profession and engineering practice;
- Awareness of engineer's responsibility for health protection and labor safety;
- Ability to maintain long-term high-level competencies.



Minimal requirements for the content of Curriculum. Determining the range of disciplines and basic subjects for each discipline, the following views concerning their destination, role and contribution to the education of engineer at a given profile, were taken into account:

The block of mathematical and fundamental disciplines has the basic objective - establishment of a solid base for engineering disciplines. In this case mathematics, physics, chemistry, informatics have a sound applicative character

The block of general social-humanitarian disciplines

The engineer operates as a team leader, a leader and an adviser for a larger or a smaller group. The engineer must be aware of social responsibilities, take into account the multiple social factors in the decision taking process. Thus, social-humanitarian disciplines form an integral part of engineering training program and the traditional disciplines in this respect are: philosophy, psychology, religion, sociology, political sciences, economics, modern languages, technology and human relations, history of technology, professional ethics, social responsibility. A great deal of these is optional or facultative.

The block of engineering disciplines

Among the basic elements of designing process are: objectives and criteria setting, synthesis, analysis, constructive design, testing, evaluation, etc. Additionally, a broad range of constraints appears, like: economic factors, security, reliability, esthetics, social impact and the impact on the environment.

Minimal requirements for didactic and methodic support of the education process.

In this section the requirements are formulated towards:

- The qualification of teaching staff
- Didactic support for the program
- Organization and evaluation of the results of practical periods.

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SCIENTIFIC RESEARCH ACTIVITY AT THE TUM

The training of engineering staff in conformity with European standards can be achieved only by an organic symbiosis of research and education.

TUM was, and still is, the only University in the Republic of Moldova which educates specialists and carries out scientific research in any field of engineering science.

At present, the Technical University of Moldova has a scientific potential valuable both quantitatively and qualitatively. In the accomplishment of scientific problems one academician, 4 correspondent members of A.Ş.R.M., 31 habilitate doctors, 338 doctors, over 170 post graduated students and almost 1100 students are involved.

The spectra of scientific problems tackled by the professorial-didactic staff of the university cover different domains of modern engineering, like: mechanics and machinery construction, computers and informatics, radio-electronics and telecommunications, energetics, food industry, civil engineering and architecture, light industry, etc.

The basic research objectives of TUM



correlate to the strategy of the Bologna process and can be formulated as follows: ensuring a high level of competence of the engineering staff; training of qualified researchers via doctorate and post doctorate, compatible on the European market; offering scientific support to the national economy; realization of the state programmes in priority strategic domains for R. of Moldova and the European Community.

Over 40 years of TUM existence 16 laboratories and research centers that function until now have been founded. Researchers, PhD and Master's students carry out research on 49 scientific directions. During the last 10 years via the 13 Specialised Scientific Councils functioning within the Technical University of Moldova 98 doctoral theses and 21 theses of habilitate doctor have been defended.

Scientific research performed by TUM collaborators resulted in 390 patents, over 1600 scientific works published in scientific journals, many monographs and handbooks, presentations at national and international conferences.

The inventions of our collaborators have been awarded with more than 60 gold, silver and bronze medals at International Fairs of Inventions in Brussels, Geneva, Paris,

Pittsburgh, Moscow, Seoul, Iaşi, Casablanca, etc.

Thirty five collaborators of our university have become Laureates of the State Prize of Moldova in the field of science and techniques.

Research carried out at TUM, which value makes almost 14,5 millions lei in 2003-2004, can be divided into two categories by its character.

The first category comprises scientific-intensive research with complex technologies of implementation that need considerable investments, which have a sound scientific, technical, educational and economical effect. The achievements in this domain form a potential which serves as basis for future scientific elaborations, ensuring the continuity of the technical science in the Republic of Moldova.

To this category belong the following elaborations: machinery construction; precessional transmissions for different applications; devices for renewable energy conversion (mini-hydro-stations, eolian installations, solar batteries); micro-optoelectronic devices for communications via optic fibers and atmosphere; industrial products design (automobiles, trucks, etc); electric

engines and electromechanical accessories; architecture of buildings and enterprises; informational technologies, etc.

The second category comprises scientific achievements that can be implemented quickly.

To the second category also belong the next elaborations performed by TUM collaborators: micro-optoelectronic devices for medical purposes; electronic devices for diverse domains; installations for agro-industrial sector; electric transformers; electric generators for the renewable energy (eolian, hydraulic, solar) transforming into electric energy.

The third category comprises elaborations performed by order of consumers.

Achievements in this category refer to domains that now can be considered as being revived: individual constructions; buildings and furniture design; clothes design, etc.

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