



TREE – Teaching and Research in Engineering in Europe
Special Interest Group A5 “Accreditation of EE in Europe”
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National systems of engineering education, QA and accreditation

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00 INTRODUCTION

Each Subsection of this Section 5.1 describes the national systems of engineering education and degrees in one of 31 countries out of the 46 of the prospective “European Higher Education Area” (EHEA), with particular attention to quality assurance, accreditation and recognition procedures. Each “national” Subsection is written (and signed) by a different author: this leads to some differences in style and content from one Section to another, but hopefully also to descriptions more lively than the “official” ones that can be found in websites. The authors are listed in the “Contents”: their contribution is gratefully acknowledged.

The whole Section 5.1 can be considered an updated and enlarged version of the document “Accreditation and Recognition in European Engineering”, published in Vol. D “Activity 2” of the Final Publication of the Thematic Network E4 (Firenze University Press, 2003), and in turn developed from Chap. 3 “Accreditation and Recognition” of the State-of-the-art Report of Working Group n.2 “*Quality and Recognition in Engineering Education*” of the previous Thematic Network H3E - Higher Engineering Education for Europe (July 1999).

Since the situation is rapidly changing, due also to the effects of the “Bologna Process”, the authors have been repeatedly asked to update their contribution: most of the texts included in this Section have been written or updated in 2007, although a few date back to 2002 or 2003.

As evident from the “national” Subsections, recognition and accreditation procedures of engineering degrees in each European country depend very much, on one side on the educational system, on the other side on how the engineering profession is organized: further considerations are developed in Section 5.2 below.

Here, let us recall that in most European countries the right to award Engineering Degrees is limited to specific Education Institutions, and academic recognition is often practically automatic within each country: difficulties can arise more from the dual educational system of many European countries, at it will clearly appear in the National Subsections.

The great novelty of the last few years is that – in the framework of the “Bologna Process”, aimed at “increasing the compatibility and comparability of [the European] higher education systems, whilst at the same time respecting their diversity” and at realising by 2010 a “European Higher Education Area (EHEA)... based on institutional autonomy, academic freedom, equal opportunities and democratic principles that will facilitate mobility, increase employability and strengthen Europe’s attractiveness and competitiveness”¹, the European Institutions (Commission, Parliament and Council of H.E.Ministers) are strongly supporting the establishment of systems for quality assurance in educational programmes, recognition of qualifications and accreditation of degrees. As it will be manifest from all TREE outcome documents, the engineering field is in the forefront of such efforts, at both the National and the European level.

It is therefore worth recalling here the schemes for trans-national recognition of degrees set up by the two main European Associations of Professional Engineers, FEANI and CLAIU (the latter concerned only with what they define “University Engineers”), namely:

- FEANI gives the title of Eurlng to individual applicants who fulfil a certain formula which takes into account Academic education in an accredited Institution, training and professional experience; as long as an applicant fulfils the quoted formula, no distinction is made between “long-cycle” and “short-cycle” graduates; “exceptional cases” are also possible, but must be approved by a specific process. The list of Accredited Institutions is published and kept up-to-date by FEANI: new Degrees can be included only after a visit by an ad-hoc Committee.
- The CLAIU approach is based directly on mutual trust between its Member Associations. In fact, each member of a CLAIU-Member Professional Association has the right to be considered as a member of all other Associations. Also CLAIU publishes a list of accredited Educational Institutions, and this is the list of the Institution accredited by the single Member Associations.

¹ “Towards the European Higher Education Area: responding to challenges in a globalised world”; Communiqué of the London Conference of H.E.Ministers, 18 May 2007

As described at length in the successive Section 5.2 of this CD, a pan-European scheme for accreditation of engineering education has been proposed by the EUR-ACE project and is now being tentatively implemented by ENAEE, the European Network for Accreditation of Engineering Education: it is to be hoped that this system will eventually lead to trans-national recognition of quality of programmes and awarded engineering degrees, extending gradually throughout the EHEA.

(Giuliano Augusti, 03/08/2007)

01 AUSTRIA

General regulations on university studies are established by Austrian Federal Law: The University Studies Act (Universitäts-Studiengesetz – UniStG, BGBl. I Nr. 48/1997). The University Studies Act regulates the requirements of degree programmes and the Federal Ministry for Education, Science and Culture establishes the study regulations for individual degree programmes.

At department level, study commissions (Studienkommissionen) articulate the course requirements (content, structure and volume of studies as well as the sequence of examinations and the allocation of ECTS-credits to the course units) for degree programmes.

It is also possible to establish new study plans or to change existing plans together with foreign universities (e.g. within ERASMUS).

1. Admission to University Studies

Competent body: Rector

- Austrian students, who want to register at Austrian universities have to document their abilities by the general university entrance qualification, the so called Reifezeugnis. Foreign equivalents have to be approved by the Ministry. Furthermore, foreign candidates have to fulfil all requirements which are obligatory for them to register at their home universities. Additional examinations of the German language (for foreigners) or special certificates for some fields of studies (e.g. Descriptive Geometry for Technical Studies) can be required.
- Foreign students who do part of their studies in Austria and complete their studies at home enrol as regular degree students in Austria, but are advised to inform themselves in advance about the regulations about foreign studies in their home country.
- Foreign students who want to complete their studies in Austria:

Competent body: Head of the Study Commissions

Students enrol as regular degree students. They must submit an application to the head of the study commission in order to have acknowledged their previous studies towards Austrian degree programme requirements.

2. Recognition

- Austrian students, who do part of their studies abroad and complete their studies in Austria

Competent Body: Study Commission/Head of Study Commission

Studies which have been completed abroad successfully are recognised, if their thematic contents and length is equivalent to those in Austria. The study commission can set up a written general regulation, which declares the recognition of certain courses, when completed successfully at the host institution (e.g. regulations concerning double degrees).

It is also possible, that co-operating universities sign general agreements about mutual recognition. If students fulfil those criteria, studies are recognised without approval of individual applications.

Another possibility is the recognition of studies prior to their completion abroad (e.g. ERASMUS). In this case the head of the study commission has to examine the requirements of the study abroad programme before the student leaves.

- Foreign/Austrian students who finished their studies abroad and register for PhD studies in Austria

Competent body: Study commission

Graduates have to document that their degree corresponds to the Austrian degree in terms of course work, examinations and written work. If academic degrees do not correspond sufficiently, additional examinations may be required.

The topic of the PhD thesis has to correspond with parts of the previous studies.

- Foreign graduates who are applying for jobs in Austria which are bound to academic degrees (e.g. lawyer) – Recognition of Foreign Degrees (“Nostrifizierung”)

Competent body: Dean of Studies

Foreign graduates have to have recognised their foreign degrees by the Dean of Studies (Studiendekan). If academic degrees do not correspond sufficiently, additional examinations may be required.

3. Tools according to Bologna Declaration

- Development of study organisation in Austria is more and more orientated towards objectives in international integration. For instance when creating new curricula a lot of attention is paid upon the possibility of student mobility. Courses and lectures in English language are being integrated in the curricula.
- Austria is sharing the development of the European Course Credit Transfer Systems (ECTS) which provides a way of measuring and comparing learning achievements, and transferring them from one institution to another. It offers security within the acts of recognition for the study commissions as well as for students. In Austria the University Studies Act requires compulsory ECTS-implementation for new bachelor- and master-courses, as well as for existing diploma- and master courses from the study year 2002/2003 onwards.
- Austria also takes part in the development (which was started off by UNESCO, the Council of Europe and the European Commission) of the Diploma Supplement, in order to facilitate transparency and recognition of qualifications for academic and professional purposes. Furthermore Austria is a member of ENIC (European Network of Information Centres) since 1982, which has been developed by the Council of Europe and the UNESCO as well as of NARIC (within the European Commission).

4. Special regulations for the Fachhochschule-Sektor

In 1993 a new type of post-secondary education was established by the “Federal Act on Fachhochschule Programmes” (Fachhochschulstudiengesetz FHSStG). “Fachhochschule programmes” (Fachhochschulstudiengänge) are application-oriented university level study programmes of at least four years duration (including work on the diploma thesis and a mandatory career-oriented practical training) with vocational-technical orientation. Institutions that offer at least two “Fachhochschule Programmes” that meet legally prescribed organisational requirements are granted the status “Fachhochschule”. Until now more than 90 “Fachhochschule Programmes” in the fields of economics, tourism, technology, telecommunications, design and management are offered. From the winter semester 2002 onwards all “Fachhochschule Programmes” will have established ECTS in their curricula. The application of accreditation of a „Fachhochschule Programme“ has to be submitted to a specially established accreditation council, the “Fachhochschule Council” (Fachhochschulrat) for approval. It examines the scientific, educational and didactic quality of a programme. The maximum period of recognition as a “Fachhochschule Programme” is five years. After this period has expired , the programme has to go in for a process of internal and external evaluation and has to apply for an extended approval. The extension depends on the results of the evaluation.

(Hans Kaiser, 23/07/2002)

Engineering Education in Belgium

Traditionally in Belgium, there are two types of engineering curricula and two types of engineering schools. The five years curriculum was taught at the “faculties of engineering” in the universities (Brussel, Bruxelles, Gent, Leuven, Louvain-la-Neuve, Liège, Mons), leading to the degree of “burgerlijk ingenieur” or “ingénieur civil” (not only in “civil engineering”!) and a 4 years curriculum at the “university colleges” (as they are called now, in Dutch “industriële hogescholen” or “Hautes écoles” in French), somewhat comparable to the German “Fachhochschulen”.

The Bologna reform has changed the picture. After the decrees of 2003 and 2004 of the Flemish and French Community respectively, the Bachelor-Master structure has been introduced gradually. Both engineering curricula still exist and aim at producing “academic” engineers with two different profiles.

At the universities (3 + 2) the emphasis in the curricula is put on basic sciences and on the development of an innovative and research oriented attitude. They lead to the Ba and MSc in engineering sciences, respectively. Contrary to the Bologna concept, strictu sensu, the Bachelor degree is not meant to be a professional degree, with which students can leave the university and start working in a company, but rather as a transition point or a “mobility” or “rotary” point”, when students can change universities or specialities. Practically all students therefore continue into the MSc programme.

At the occasion of the Ba-Ma reform the curricula have been completely revised but the general concept of the education has not changed: there is still a great emphasis on basic sciences and the Ba-Ma curriculum is not different from an integrated 5 years curriculum. However, more attention than before has been paid to self-study, project based learning and design. 10% of the credits are to be earned in non technical subjects. The students are strongly encouraged to add an international dimension to their study e.g. by staying 1 or 2 semesters abroad, by attending short courses (e.g. ATHENS), by spending a training period with a foreign company, by doing the field work for their Master thesis abroad...

Students who finish the Master programme obtain the title of “burgerlijk ingenieur/ ingénieur civil”, protected by law, which allows them to exercise the engineering profession. There is no additional profession accreditation in Belgium.

The former curricula offered by the university colleges have also been transformed into the Bachelor-Master system (3 + 1 in Flanders and 3 + 2 in the French Community). This is realised by the collaboration of the university colleges (former “high schools”) with the universities. In Flanders these networks are called “associations”, each of them centred around one university. In the French speaking Community university colleges can join a “Pôle Universitaire”, consisting of one or more universities. They deliver a Bachelor and Master in industrial Sciences, after which they are entitled to the title of “industriël ingenieur/ ingénieur industriel”. The profile of this type of engineer is tailored to the direct needs of industry: production and problem solving, using up to date, existing knowledge and tools.

Quality insurance

While the entrance examination (mathematics) for the universities has been abolished in Flanders, it is still compulsory in the French Community.

Every Master programme has its own curriculum committee, comprising a large student delegation, that monitors the programmes and the quality of their implementation. In addition, there is an overarching educational committee in each faculty/ school/ university.

Every five years a self evaluation report has to be prepared as the basis of an evaluation by an external committee. In Flanders these “visitations” are organized by the Flemish Interuniversity Council (VLIR) and VLHORA (“high schools”). Members of the committee are recruited from both

(foreign) universities and the professional world. These reports are used as an input for the international accreditation board (NVAO) which accredits the curricula. In the French Community the evaluation of the university education is organized by the Ministry of Education.

(Jean Berlamont, 21/05/2007)

03 BULGARIA

1. Structure and degrees in the higher technical education

The evolution of the legal framework governing the higher education area followed the changes in the social and political life in the country. Important steps were the enforcement of the Academic Autonomy Law (1990), Higher Education Act (1995) and a number of regulations, amendments and additions to the Higher Education Act. The most important change in the Higher Education Act was the creation of the National Evaluation and Accreditation Agency. It was created under a two-year project financed by EU's PHARE (Students and Academic Staff Mobility) Programme.

The Higher Education Act calls for a new structure in the degrees. According to it, the two level structure (Bachelor and Master) is compulsory for all higher education institutions, except for the so-called regulated professions/specialties, where a direct route to the Master degree is compulsory.

2. Provisions for accreditation. Types, procedures and duration

After the National Evaluation and Accreditation Agency was constituted, procedures for evaluation of universities were started. There are two types of accreditation in Bulgaria: **institutional** and **programme level** accreditation. Generally speaking, institutional accreditation emphasises the governance of the university and its management (both financial and academic) and evaluates activities and their priorities. The institutional accreditation is a pre-requisite for programme level accreditation. The programme evaluation focuses on one faculty and its programme degrees and looks more deeply upon teaching and learning.

The successful accreditation gives a university a status of recognition and licence to operate for a definite period of time (the period depends on the assessment mark given and can vary from 3 to 5 years).

3. Academic and professional recognition

The Ministry of education and science has appointed a special commission which is in charge for the academic recognition of higher education diplomas/degrees awarded by foreign universities and institutes.

The professional recognition for some but not all engineering fields will be carried out by the currently being established Chamber of the architects and design engineers.

4. Expected/ forthcoming changes

The Higher Education Act is expected to undergo a serious modification and update which is planned for the autumn of this year (2003). The programme level accreditation will not be required anymore according to the foreseen changes.

At this moment of time the accreditation criteria are harmonized with the European. However, there is much to be done in this direction. It is intended the current Bulgarian law to be upgraded in order to facilitate the implementation of European requirements in accreditation.

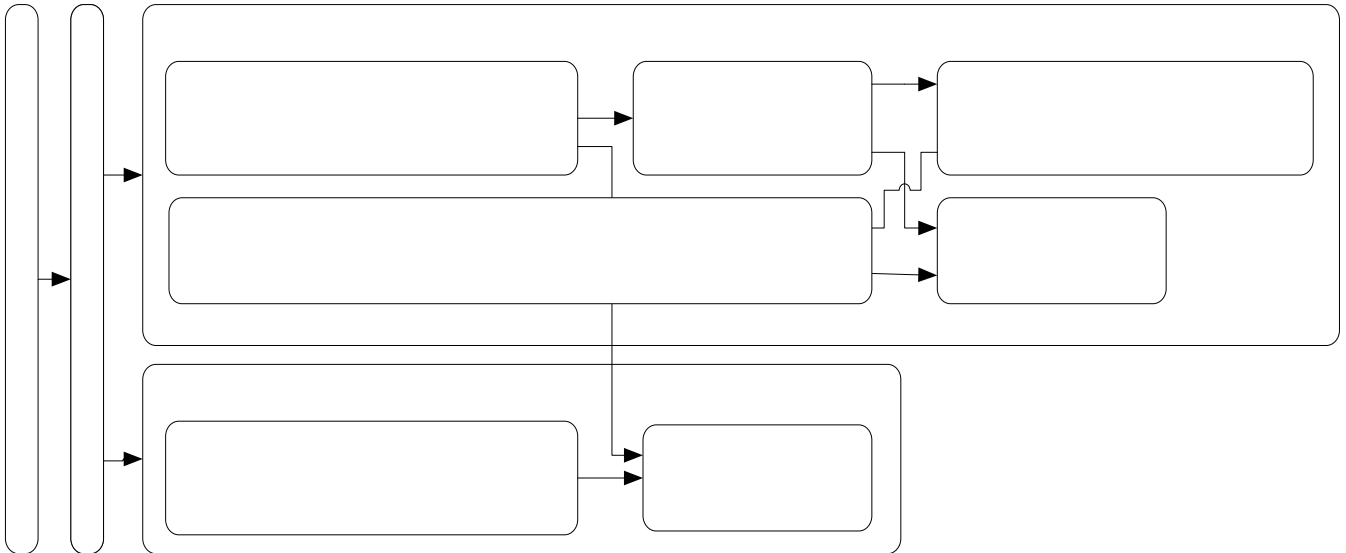
(Zdravko Bonev, 28/03/2007)

04 CROATIA

NATIONAL HIGHER EDUCATION SYSTEM IN CROATIA

(The following is in part a compilation of texts from the website of the Croatian Ministry of Education, Science and Sports www.mzos.hr.)

Scheme of the Educational System in Croatia



Types of Higher Education Institutions and Institutional Control

Higher education is conducted through universities and professional studies. University study educates students for work in science and higher education, business world, public sector and society in general, as well as for development and application of scientific and professional achievements. Professional study gives students appropriate level of knowledge and skills enabling the performance of trade jobs and educates them for immediate inclusion in the work process. Professional studies are conducted in a professional school of higher education or a polytechnic, but can also be conducted at a university or its component.

A university is an institution that establishes and conducts university and interdisciplinary studies in at least two areas of scientific or artistic activity in a number of fields, as an autonomous and integrated process, indirectly or through its faculties, art academies and departments. University comprises the following: faculties, art academies, departments and institutions, as well as foundations, associations, student centres, health institutions, libraries, and technological centres. Faculty is an institution of higher education, a component part of a university, where university studies are organized and conducted, and where scientific and professional work in one or more scientific or professional areas is developed.

Art academy is an institution of higher education, a component part of a university, where artistic study is organized and conducted, and where top artistic endeavours and scientific activity in the field of art are nourished.

University department is a component part of a university where university courses are taught, and scientific, artistic or professional work in a particular field of science or an interdisciplinary area are developed.

University institute is a component part of a university established for the purpose of performing scientific activity in one or more related fields, linked with the process of higher education at a university. Highly professional work can be conducted there, and it can participate in instruction pursuant to university regulations.

1 - 8 years

ol - 4 years

University

Undergraduate
3-4 years, B

In polytechnics and professional schools of higher education professional studies are organized and conducted. At least three different studies in a minimum of three different fields are conducted at a polytechnic.

Universities, polytechnics and professional schools of higher education are established as institutions. A university may establish faculties, art academies, departments, and other component parts pursuant to the law.

Universities are established by a law, public polytechnics and professional schools of higher education are established by a decree of the Croatian Government, while private universities and polytechnics are established by a resolution of the founder.

Types of programs and degrees awarded

University and professional education is harmonized with those of the European Union. Higher education is organized according to the system of transferable points and has three levels:

1) undergraduate courses, which typically last for three to four years and bring 180 to 240 ECTS points. Undergraduate courses provide students with training for graduate courses and the possibility of finding employment in certain specialized jobs. Upon the completion of the undergraduate courses, students are awarded the academic title *baccalaureus* or *baccalaurea*, with their profession also indicated, unless the law specifies otherwise;

2) graduate courses, which typically last for one or two years, bring 60 to 120 ECTS points;

3) postgraduate courses which can be taken after completing a graduate university course – they typically last for three years, and the academic title *doctor of science (dr.sc.)* or *doctor of arts (dr.art)* is awarded upon completion. The university can also offer postgraduate specialist courses which last for one to two years, by which one can acquire the title of a specialist (*spec.*) in a certain specialist field.

Professional degree courses are offered at polytechnics and independent schools of professional higher education but also at the university. Professional degree courses last for two to three years and bring 120 to 180 ECTS points upon completion. Upon completion of a professional degree course, the students are awarded the title *professional baccalaureate*, with the indication of the profession. Polytechnics and schools of professional higher education can organize a specialist professional graduate degree course for people who have completed a professional degree course or an undergraduate university course. The specialist professional graduate degree course lasts for one to two years after which the title of specialist of a certain profession (*spec.*) is awarded.

Approval/Accreditation of Programs and Degrees

All institutions and study programs must be accredited by the National Council of Higher Education. This is an expert and advisory body concerned with the development and quality of the whole scientific activity and the system of science in the Republic of Croatia. It's main tasks are to:

- propose to the Minister the rules on standards and criteria for the establishment and evaluation of new higher education institutions and programs of study
- appoint reviewers and give opinion on the establishment of new higher education institutions and programs of study
- evaluate higher education institutions and programs of study and proposes to the Minister issuance of licenses

Evaluation of the institutions and study programs is performed once every 5 years.

Accreditation of engineering programs is not officially different from others in Croatia. It is all left to common sense: there are no special rules or guidelines. The National Council of Higher Education, on the basis on the reviewers' opinion, approves engineering studies just like any other discipline.

Organization of Studies

Integrated "Long" (one-Tier-) Programs: (Diplom degrees, Magister Artium, Staatsprüfung)

Only a minority of study programs in Republic of Croatia are organized as integrated, "Long" programs. A typical example is medical school, which lasts for 6 years, leading to the professional title Doctor of medicine.

First/Second Degree Programs (Two-tier): (Bakkalauereus/Bachelor - Magister /Master degrees)

Undergraduate (first-level, bachelor) study programs can be enrolled after successful completion of a secondary school (high school). Normally, secondary school lasts for 4 years, continuing to 8 years of primary school. Most undergraduate study programs last for 3 years, leading to the Baccalaureus degree (B.A., B.Sc.), with indication of profession. A few last for 4 years. Generally, the study includes the thesis requirement.

Graduate (second-level, master) study program can be enrolled upon successful completion of an undergraduate study program. A university defines which undergraduate study is appropriate for enrolment in graduate studies, as well as the enrolment requirements for applicants who have completed different undergraduate or graduate studies. In principle, graduate study programs last for 2 years, with few 1 year exceptions, leading to the Master degree (M.A, M.Sc.), with indication of profession. All master programs require a master thesis.

Specialized Graduate Studies

A university can organize specialized postgraduate study lasting from 1 to 2 years, which leads to a Specialist title (spec.) for a certain area. This title is usually added to the original graduate title.

Doctorate

Postgraduate university study can be enrolled upon successful completion of a university graduate study program. In principle, it lasts for 3 years. After all requirements are fulfilled and the doctoral dissertation is publicly defended, academic title Doctor of science or Doctor of arts is received.

Grading Scheme

The grading scheme consists of 5 numerical grades. There are four passing grades: 5 - *izvrstan* (excellent), 4 - *vrlo dobar* (very good), 3 - *dobar* (good) and 2 - *dovoljan* (sufficient). Non-passing grade is 1 - *nedovoljan* (insufficient).

Access to Higher Education

Citizens of the Republic of Croatia and persons of Croatian nationality domiciled outside the Republic of Croatia, as well as foreign nationals and stateless persons permanently residing in Croatia, have the right to enrol at a course of study under equal conditions. Foreign nationals and stateless persons who are not permanently residing in the Republic of Croatia have the right to enrol at a course of study under the terms set by the Ministry, on the basis of intergovernmental agreements and treaties. The Ministry decides on the level of tuition fees. Students who are foreign nationals, and who will pursue their studies with the status of a full-time student, pay annual tuition fees that are no more than three times higher than those of a full-time study (unless differently specified by a treaty). In private schools, all categories of students bear the costs of their tuition fees.

Under the 2003 Scientific Activity and Higher Education Act, enrolment in a course of study continues to be performed on the basis of a public competition announced by the university or by an independent school of professional higher education or polytechnic. The classification and the selection criteria for the enrolment of candidates are established by the university or by the independent school of professional higher education or polytechnic. Foreign nationals may enrol in a course under conditions equal to those of Croatian nationals, but, in conformity with the decision of the authorized government body or higher education institution, they may be required to partly or

fully bear the cost of their studies. Admission to studies may be limited or denied to foreign nationals if the course in question concerns military or police education or other studies of interest to national security.

(Vedran Mornar, 04/03/2007)

05 CYPRUS

In Cyprus the engineering academic title is recognized for the graduates of one of Engineering Departments of the University of Cyprus. The equivalence of foreign academic titles with the University of Cyprus graduate engineers is granted by KYSATS (Organization for the Recognition of Foreign Titles of Studies), being the competent authority for the recognition of diplomas of foreign Universities.

The Technical Chamber of Cyprus (ETEK) (Law 224/90-97) regulates the Engineering Profession in Cyprus. The practice of the Engineering Profession and the use of the relevant title is limited to people who register with the Technical Chamber.

The Technical Chamber of Cyprus, according to the provisions of the aforementioned Law regulates the following professions:

1. Architecture, including Landscape Architecture
2. Civil Engineering, including Landscape Engineering
3. Mechanical Engineering
4. Electrical Engineering
5. Electronic Engineering and Computer Engineering
6. Chemical Engineering
7. Mining Engineering and Geology
8. Rural and Surveying Engineering
9. Quantity Surveying and Land Valuation
10. Town and Urban Planning

The academic requirements to become a member of the Technical Chamber of Cyprus are as follow:

- The candidate must hold a university degree accredited by the competent official bodies of the country of issue.
- The candidate should attend successfully taught courses majoring in the field of engineering applied for registration, at university level.
- The candidate should be eligible to register as engineer and exercise engineering activities without any limitations in the country of graduation.

(P.Papanastasiou, 10/04/2007)

06 CZECH REPUBLIC

Law establishes general regulations on university studies. The Higher Education Act regulates activities of universities and non-university higher education institutions.

Two types of engineering curricula are offered in Czech Republic:

- So-called "long programs" 5 or 5-and-half year curriculum leading to the degree "Ing." - engineer at Technical and Economical Universities.
- So-called "structured programs" - 3 or 4 year curriculum of bachelor degree leading to the degree "Bc.". That could be possibly but not obligatory continued by 2 year master degree program (master degree in engineering "Ing.").

Currently, there are five technical universities in the Czech Republic. Until 1992 all of these schools taught students in masters degree courses of five or five-and-a-half years. The law of 1992 allowed changing the educational structure at universities, and bachelor's degree courses of two types were created.

The so-called parallel programs were intended for bachelor students generally undertaking three or four years of study. These graduates were trained for technical professions and entrepreneurial jobs. Students were always allowed to transfer to master's degree courses subject to various conditions, such as the entering of a lower grade in a five-year course, or taking part in an individually designed equivalency program.

In addition, "serial type" bachelors degree programs were instituted. These programs merely consisted of parts of the original programs and divided them into two stages. A bachelor's degree was thus awarded to graduates with an "incomplete" course of study. Such graduates generally continued their study rather than took up a practical job. At some universities the Accreditation Commission scrutinized these study programs, but the commission did not restrict the programs to any major extent. Traditional universities enjoy great authority and the Accreditation Commission was aware that the quality standard would always be maintained, particularly because the methodologies and syllabus used at that time did not change substantially.

The existing law amended in early 2001 mandates a structured study program with a mandatory bachelors degree. As part of this plan it is required that bachelors degree programs form a closed stage of higher learning and, concurrently, a sufficient preparatory stage for a masters degree program. It calls for deep restructuring of study programs at all schools of higher learning. The Accreditation Commission will need to evaluate the process and grant its consent to each school for the transition to study programs so designed.

Accreditation Commission – members and membership

The Accreditation Commission consists of 21 members. The Government upon a nomination by the Minister appoints the Chair, vice-chair and members of the Accreditation Commission. Prior to making a nomination, the Minister shall request references from the representation of higher education institutions, the Governmental Board of the Czech Republic for Research and Development and the Academy of Sciences of the Czech Republic and discuss the nomination with these institutions.

Members of the Accreditation Commission are appointed for a six-year term; they can be appointed for the maximum of two terms of office. They represent irreproachable persons enjoying general authority as experts. A member of the Accreditation Commission may be dismissed only in case of losing one's integrity, long-term non-participation in the work of the Accreditation Commission, or upon his/her own request. They are provided with reimbursement of travel expenses as per special regulations and may be provided with recompense. Membership in the Accreditation Commission is incompatible with the duties of Rector, Vice-rector and Dean.

Members of the Accreditation Commission perform their duties independently. Activity of the Accreditation Commission members is deemed an act in the interests of the public. Submissions to the Accreditation Commission are made via the Ministry.

Accreditation Commission – responsibilities

The Accreditation Commission takes care of the quality of higher education and performs comprehensive evaluation of educational, scholarly, research, developmental, artistic or other creative activity of higher education institutions.

In order to achieve these objectives, it must perform the following:

- Evaluate activities pursued by higher education institutions and the quality of accredited activities and publish the results of such evaluations.
- Assess other issues concerning the system of higher education presented to it by the Minister and express its standpoints over these issues.

The Commission collect written applications for study programme accreditation and written applications for accreditation of procedures for obtaining "venium docenti" (habilitation) or procedures for appointment of professors in a given field.

The Commission is authorized to decide over the following:

- Applications for accreditation of study programs.
- Applications for accreditation of procedures for obtaining "venium docenti" (habilitation) or procedures for appointment of professors
- Establishment, merger, amalgamation, splitting or dissolution of a faculty of public or state higher education institution.
- Granting the state permission for a legal entity desiring to operate as a private higher education institution.
- Determining the type of a higher education institution.

The Commission is authorized to establish work groups

- The permanent work groups for judging the applications of institutions.
- The special work groups, which are established only for the period of evaluation of chosen institution or institutions.
- In the area of professional fields that are not represented in the Commission, the Commission may authorise also a person who is not its member to present the proposal to establish work group.

The Commission may appoint as a Chair of a work group even a person who is not its member.

Applications for study programs

Contents of Application:

- Study program title.
- Titles and characteristics of study branches in case those studies program are divided into study branches, feasible combinations of the latter included.
- Objectives of studies related to the entire study program as well as specific objectives of individual study branches in case that study program is divided into these.
- Profile of a study branch graduate, which comprises: Specification of acquired general, professional and particular knowledge and abilities. Characteristics of professions which graduate should be prepared to exercise as well as of other possibilities of their employment and characteristics of employers where graduates could use the acquired education.
- Conditions that must be met by students within the framework of their studies and upon its completion.
- Evidence of study programme provision.
- Objectives and motivations of study programme.

An accreditation of a study program is awarded for at most double of the standard length of study. The validity of an accreditation can be extended repeatedly: while providing an accredited study program, the higher education institution may request an accreditation of its extension.

An accreditation of a study program may be requested by legal entities with domicile in the Czech Republic undertaking educational, scholarly, research, developmental, artistic or other creative activity. Such a request is made together with a higher education institution.

(Jan Uhlir, 19/10/2002)

07 DENMARK

Institutional recognition/accreditation procedures

Higher education institutions are publicly financed and state-regulated. The quality of higher education is assured by ministerial approval of new programs and institutions, external evaluators and an accreditation system.

The Universities report to the Ministry of Science, Technology and Innovation whereas the University Colleges and Colleges report to the Ministry of Education.

The institutions are autonomous, directed by a board with external members, but must comply with ministerial regulations of qualifications of teaching and research staff, award structures, study programmes and quality assurance.

In 2004 the Ministry of Education set up an accreditation program for institutions at college level to allow these institutions to be granted the status of University College. The accreditation process is handled by EVA – the Danish Evaluation Institute, who is a member of ENQA - European Association for Quality Assurance in Higher Education.

Further all higher educational programs are accredited by EVA since 2004.

Admission to higher education

Students are granted access to higher education based on their secondary school exam (12 years of education). In addition, to be admitted students often need to fulfil specific requirements in their secondary school exam: Engineering programs require specific requirements in mathematics, physics and chemistry. Students who do not fulfil these requirements may attend a preparation course (Adgangskursus).

In 2006 the Danish government introduced tuition fees for non-EU/EEA-residents. Danish citizens as well as other EU/EEA-citizens are still financed by the Danish state. The tuition fees are fixed by each institution. For engineering programs the tuition fee is app. 100.000 DKK per academic year (app.13.000 EURO) at the moment.

B.Eng., B.Sc.Eng, M.Sc.Eng

Until 2005 Danish institutions offered 2 different engineering degrees:

- A 3½-year “Diplomingeniør” offered in engineering colleges and universities
- and a full 5-year “Civilingeniør” offered in universities

In 2005 the 3+2 Bologna model was introduced in the universities leading to a 3-year B.Sc.Eng. giving access to further studies (2-year M.Sc.Eng.-degree). Universities also offer a 3½-year B.Eng-degree.

The University Colleges of Engineering offer 3½-year B.Eng. degrees leading to a professional career. B.Eng.-graduates may also pursue further studies for a M.Sc.Eng.-degree (2-years).

B.Eng. – “Diplomingeniør” – the medium cycle professional qualification

The 3½ year B.Eng degree – offered by a University or a University College – is offered at university level and usually prepares students for a professional career. These programmes provide students with theoretical knowledge as well as knowledge of application of theory in industry.

All programs include one semester of industrial internship and one semester of final thesis project.

All graduates B.Eng. and M.Sc.Eng. may sign up as member of the Danish Society of Engineers (IDA). IDA is a member of the Danish Confederation of Professional Associations (AC) and a member of FEANI. Danish Engineering programs are registered/ accredited by FEANI and individual members may apply for EUR-ING recognition.

(Flemming Krogh, May 2007)

5.01.08 ESTONIA

ESTONIAN HIGHER EDUCATION SYSTEM

GENERAL FRAMEWORK

Higher education is primarily regulated by the Universities Act, the Institutions of Applied Higher Education Act, and the Private Schools Act.

The Estonian higher education system is binary and consists of universities (ülikool) and applied higher education institutions (rakenduskõrgkool). Some vocational schools also have a right to offer professional higher education programmes. Based on the form of ownership, institutions of higher education can be divided into state, public and private institutions.

Since the academic year of 2002/2003, the general structure of the higher education system is based on two main cycles, following the undergraduate-graduate model. The first cycle is the bachelor level; the second cycle is the master level. For some specialities, the study programmes have been integrated into a single long cycle, leading to a master level qualification. The highest stage at universities is doctorate studies. Applied higher education programmes constitute the first stage of the higher education system and correspond to bachelor level programmes.

Universities are institutions that provide academic higher education and can also offer professional higher education programmes. Institutions of applied higher education provide professional higher education and may offer master level programmes in the field of theology and defence or in other fields in cooperation with universities.

2. ACCREDITATION AND RECOGNITION OF QUALIFICATIONS

Accreditation is a process in the course of which an institution of higher education or its study programme is evaluated. The Higher Education Quality Assessment Council, in cooperation with foreign experts, carries out accreditation. The term of validity of a positive accreditation decision is seven years. A conditional accreditation decision is also a positive decision the term of validity of which is three years.

Qualifications awarded to students who have completed a study programme that has been accredited positively as well as the qualifications that have been awarded up to two years before a positive accreditation decision are deemed to be recognized by the state. Diplomas of public universities awarded upon the completion of study programmes that were registered before 1 June 2002, as well as diplomas awarded upon the completion of professional higher education programmes that were registered before 30 June 2003 enjoy state recognition even without being accredited.

For more information please look OECD thematic review about Estonian higher education and/or Higher Education in Estonia 2004.

3. ADMISSION REQUIREMENTS

3.1. General requirements

The general admission requirement to an institute of higher education is secondary education evidenced by a respective certificate – secondary school leaving certificate, certificate on acquiring secondary vocational education, other respective certificates and diplomas from previous systems and foreign qualifications giving access to higher education.

The secondary school leaving certificate (Gümnaasiumi lõputunnistus) is awarded after 12 years of studies (9 years of basic education and 3 years of secondary education).

Since 1997, secondary school students must pass state examinations (as of 1998 there are three examinations). The Gümnaasiumi lõputunnistus is valid with the state examination certificate – Riigieksamitunnistus.

3.2. Specific requirements

In addition to general requirements an institution of higher education may impose specific admission requirements such as entrance examinations, result of state examinations, speciality tests or interviews, etc.

4. ORGANISATION OF THE COURSE OF STUDIES

The Standard of Higher Education establishes general requirements for studies, curricula and academic staff. The nominal duration of studies is measured in academic years, the scope of the curriculum in credit points (ainepunkt, or AP). One credit point corresponds to forty hours (one study week) of studies performed by a student. One academic year consists of 40 credit points, which corresponds to 60 credits of the European Credit Transfer System (ECTS).

5. HIGHER EDUCATION QUALIFICATIONS

Professional higher education qualifications

Professional higher education is the first stage of higher education, established from the admission of the academic year of 2002/2003, which aims at acquiring the competencies necessary for work in a certain profession or further study in the master level. The nominal length of study is 3 to 4.5 years, 120 to 180 AP (180 to 240 ECTS credits). Graduates who have completed their studies are awarded a diploma (on a bluish-gray form, marked with E) certifying the completion of the professional higher education programme – rakenduskõrgharidusõppe diplom (professional higher education diploma).

Professional higher education studies have developed from higher vocational education studies and diploma studies that applied until the academic year of 2002/2003. The aim of higher vocational education studies was to acquire general education as well as professional and occupational knowledge and skills. Diploma studies were of applied content, the purpose of which was to acquire practical knowledge and skills. The nominal length of both studies was 3 to 4 years. Higher vocational education and diploma studies differed in their requirements for teaching staff and the scope of practical training.

5.2. Bakalaureusekraad

Bakalaureus-study is the first stage of bachelor level higher education study with the aim of increasing students' level of general education, acquiring basic knowledge and skills in the speciality necessary to pursue further studies at the master level and for commencing work. The nominal length of studies is generally 3 years, 120 AP (180 ECTS credits), and in few disciplines up to 4 years, 160 AP (240 ECTS credits).

The main aim of the bakalaureus-study programmes registered before 1 June 2002 was to develop theoretical knowledge and skills in the selected work area and the completion of the programme granted the right to work in a position requiring high-level specialist qualifications. The nominal length of studies was predominantly 4 years, along with teacher training that could be extended up to 5 years. Under the conditions and in the manner established by the university the completion of a programme registered before 1 June 2002 can be regarded as a part of studies at master level.

Graduates who have completed their studies are awarded a degree – bakalaureusekraad – which is certified by a diploma (on a greenish yellow form, marked with L; programmes registered before 1 June 2002 are on a blue form, marked with B).

5.3. Magistrikraad

Magister-study constitutes the second stage of master level higher education during which speciality knowledge and skills are developed further and knowledge and skills necessary for independent work and pursuing studies at a doctorate level are acquired. The main purpose of the magister-studies is to train a specialist with deep theoretical knowledge. The admission requirement is the bakalaureusekraad or an equivalent level of qualification. The nominal length of the studies is 1 to 2 years, 40 to 80 AP (60 to 120 ECTS credits), but along with the first stage at least 5 years, 200 AP (300 ECTS credits).

Upon completing magister-study programmes registered before 1 June 2002, a magistrikraad is awarded as a research or professional degree. Research constitutes at least 50 percent of the studies in a research magister programme and a novel scientific treatment of a speciality problem is presented in the final thesis. Research, development or creative work constitutes at least 25 percent of the scope of studies in the professional magister programme and the studies are aimed at finding a novel solution to a professional, creative problem. Under the conditions and in the manner established by the university the completion of a magister-study programme registered before 1 June 2002 can be regarded as a part of doctorate studies.

Graduates who have completed their studies are awarded a degree – magistrikraad – which is certified by a diploma (on a silver form, marked with M; programmes registered before 1 June 2002, on a brown form, marked with C).

5.4. Qualification of integrated long-cycle programmes

The integrated long-cycle studies contain both bachelor and master level studies. Completion of the study programme provides a qualification corresponding to the magistrikraad. The studies are characteristic of medicine, veterinary medicine, pharmacy, dentistry, architecture, civil engineering and class teacher training. The nominal length of medical studies, and since the admission of the 2002/2003 academic year also veterinarian studies, is 6 years, 240 AP (360 ECTS credits), and in other fields 5 years, 200 AP (300 ECTS credits).

Graduates who have completed their studies are awarded a diploma (on a silver form, marked with M; programmes registered before 1 June 2002, on a brown form, marked with C) certifying the completion of the respective integrated programme. By a decision of the university the magistrikraad may be awarded.

5.5. Doktorikraad

Doktor-studies constitute the highest stage of higher education aimed at acquiring knowledge and skills necessary for independent research, development or professional creative work. The general admission requirement for doctor-studies is a magistrikraad or a corresponding qualification. The nominal length of studies is 3 to 4 years, 120 to 160 AP (180 to 240 ECTS credits).

Graduates who have completed their studies are awarded a degree – doktorikraad, which is certified by a diploma (on a golden form, marked with O; programmes registered before 1 June 2002, on a white form, marked with D). The degree is a research degree for which the candidate has to compose and defend a doctorate thesis – independent scientific research or creative work.

(Monika Ilves, 16/05/2007)

09 FINLAND

The Finnish higher education system consists of two complementary sectors: polytechnics and universities. The mission of universities is to conduct scientific research and provide undergraduate and postgraduate education based on it. Polytechnics train professionals in response to labour market needs and conduct R&D which supports instruction and promotes regional development in particular.

Steering and financing of Finnish higher engineering education

Universities enjoy autonomy and freedom of research. They are state-owned, subordinate to the Ministry of Education and mostly financed from the state budget. Besides legislation and policy outlines, the steering is based upon three-year performance agreements between each university and the Ministry. These agreements specify the objectives and targets of university operations, and they are annually reviewed. The public funding of universities is allocated according to their future targets and their ability to meet the past ones. Out of the 20 Finnish universities only seven have a permission to confer engineering degrees.

Polytechnics (i.e. universities of applied sciences) are municipal or private institutions, which are authorised by the government. The authorisation determines their educational mission, fields of education, student numbers and location. Polytechnics are mainly financed by the government and partly by the local authorities. Similar to universities, polytechnics enjoy autonomy at the same time as they are steered with performance agreements by the Ministry. Most of the 30 Finnish polytechnics have engineering degree programmes.

Traditionally the Finnish higher engineering education has had very strong connections with industry and economic life. Due to this close co-operation the share of external funding is fairly high, corresponding to as much as half of the whole budget in some of the universities of technology. Working besides studies is very common. In addition to active informal co-operation, such as research projects or practical training in the companies, the industry and other major stakeholders are usually represented in the administrative bodies of the universities and polytechnics.

Studies and degrees

Universities and polytechnics determine their admission criteria autonomically. The student selection is based upon numerous clauses. In engineering degree programmes entrance examinations are an important part of the selection process.

In universities, students are admitted to study for the Master's degree. However, they first complete the Bachelor's degree. Bachelor of Science in Technology takes three years to complete, and its extent is 180 credits (ECTS). Master of Science in Technology is 120 credits and it takes two years of full-time study in addition to the Bachelor's degree. Universities also have postgraduate licentiate and doctoral degrees, and continuing education and open university instruction.

In polytechnics almost all of the engineering students are studying for the Bachelor of Engineering degree. It takes four years to complete it the Bachelor's degree, and it consists of 240 credits (ECTS). There is a professionally oriented Master's degree (60 credits and 2 years), which was introduced quite recently and isn't therefore that common yet. Polytechnics have adult and open education, too.

Quality assurance of Finnish higher education

Quality assurance of Finnish higher education is based upon three elements: national higher education policy, national evaluations and the quality assurance of the individual higher education institutions. The universities Act and Decree as well as the polytechnics Act and Decree determine

the status of the institutes in the educational system, their degrees, fields of study and basic responsibilities. As described above, the Ministry of Education is responsible for the quantitative evaluation of higher education institutes. The Ministry is also developing new methods and criteria for the decisions on starting and ending degree programmes and evaluating the existing ones.

The national evaluations of the quality of higher education are carried out by an independent expert body, the Finnish Higher Education Evaluation Council (FINHEEC). Since FINHEEC was established in 1995, it has conducted institutional, programme and thematic evaluations, quality audits of polytechnic education and selected the high-quality units (so called centres of excellence) in universities and polytechnics.

As a response to the objectives set in the Berlin communiqué, FINHEEC is currently auditing the quality assurance systems of Finnish universities and polytechnics. This type of auditing is seen to promote the independence and diversity of the higher education institutes better than accreditation.

The quality assurance systems will be evaluated from the institutional and the faculty and programme point of view. The audit targets include for example the objectives and documentation of the quality assurance system and the involvement of different stakeholders. If the institute's quality assurance system is not comprehensive, effective and transparent enough, there will be a re-audit.

The aim is to audit the quality assurance systems of all the Finnish universities and polytechnics by 2010. The audit of the institutes quality assurance system supposed to be repeated every sixths year.

The main responsibility for the quality of education lies with the higher education institutes. They are required to participate in the national evaluations and expected to continuously improve the quality of their activities. All of the Finnish universities have been evaluated institutionally by FINHEEC. When the polytechnics were established in the late 90's, they were all accredited by FINHEEC.

(Sanna Allt, 03/08/2007)

10 FRANCE

1) Short description of the French education system in the field of engineering

Historically the French system of “Grandes Ecoles” was developed at the end of the 18th century outside the universities.

Today they educate top-level managers for the State, the Industry, the Banks and Businesses, etc. Those upper-level schools are still the basis for the development and structure of all French engineering schools. The large majority of them belong to the Ministry of Education, but a few of them are still allocated to other Ministries like the Ministry of Defence, of the Industry, of Agriculture or of Telecommunication.

This system is historically based on the selection of the best students after the A-level (Baccalauréat) and another selection after the Preparatory School (Classes Préparatoires aux Grandes Ecoles) taking place before the engineering schools:

2 years of Preparatory School: mathematics + physics

3 years of engineering school: engineering science + basics in business/management + languages + internships

Today it still takes 5 years after the A-level to acquire a degree in engineering, and this without any exceptions!

The selection system and duration may vary. An increasing number of university students are now integrating Engineering Schools after examination of their candidature.

2) Role of the French State

The “Bureau des Écoles d’Ingénieurs”, the General Office of Engineering Schools, is a part of the Ministry of Education in charge of the administrative matters regarding the Engineering Schools.

As far as the Engineering Education itself is concerned (school policy, curricula, outcomes, recruitment, etc.), an evaluation on a regular basis of 6 years is provided by a team of national experts in the field of engineering education, called the “Commission des Titres de l’Ingénieurs” (CTI).

The CTI’s evaluation leads to an accreditation, giving the school the right to deliver a title of « Ingénieur diplômé », for a period of maximum 6 years. Regarding the public schools, this is a decision of the HE Minister or eventually of the technical concerned minister (Agricultural, Industrial, Defence,...). For the private schools, the decision is directly of the CTI competence.

Besides, there exists a coordinating body, involving also CTI, namely the “Conseil National de l’Enseignement Supérieur et de la Recherche” (CNESER: National Council of higher Education and Research), also founded by law and presided by the French Minister of Education.

3) Process of Accreditation²

In France, the title of “Ingénieur diplômé” is protected by law, and only schools accredited by a national “Commission des Titres d’Ingénieur” (CTI) are allowed to award it.

The CTI was founded by law as early as 1934, with the following missions:

² In the CTI document “References and orientations” (translated also in English), a Chapter “Process of Accreditation” can be found.

- Accredite all new engineering programs,
- Assess the quality of existing engineering curricula, and take the initiative of any enquiry within accredited schools and universities,
- Take part in any study related to the strategy and/or development of engineering
- Participate in various international activities, as, for instance, to be a member of ECA (European Consortium of Accreditation), or of ENQA as well as an active member of ESOEPE, deeply involved in the EUR-ACE project, so as to establish a European template of standards in Engineering education Accreditation..

The CTI is composed of 32 members appointed for 4 years (and re-electable for a second 4-year term),

- half of them representing institutions of all kinds (public "Grandes Ecoles", other public or private schools of engineering, universities of technology etc.) awarding an engineering degree,
 - half of them representing industry managers, the associations and trade unions of engineers.

This twofold composition is much appreciated, since it involves all people interested in the training of engineers, and it has remained unchanged since the very creation of the Commission.

The secretariat and material support of the Commission is devoted to the Ministry of Higher Education (General Office of Engineering Schools).

First accreditation -or assessment- visits are decided by the plenary Commission, who appoints a team of at least 2 members or experts belonging to two different categories, the size of the team being related to the size of the visited institution. The Commission decided jointly with the ministry of higher education that, instead of non systematic "inspections", every curriculum would be assessed, and its accreditation renewed on a six year basis. In addition, a small report on the implementation of CTI requirements and on new events within the institution, is provided on a 2-year basis. Thus CTI is in charge of reviewing over 300 different curricula periodically, and the work load of the Commission has strongly increased, so that a "college" of 32 experts has been appointed by the Commission to participate in assessment visits.

The criteria used by evaluators are made public through a periodic CTI publication named "Références et Orientations" so that any institution is aware of the requirements. Briefly speaking, the evaluators should examine:

- the general educational environment of the school or department, with particular attention to its relations to the employment market,
- the general philosophy of the curriculum, specialities chosen, originality and/or credibility of the education project etc.
- detailed organisation of studies, scientific and technical programs, tutorials, lab. work, industrial internships, language studies, economic and managerial formation, assessment procedures of courses by students etc.
- student recruitment procedures, presence of foreign students according to exchange agreements, possible access to adults in continuing education
- number and quality of scientific staff ,
- research activity and production, links of research with undergraduate students' education,
- finance, premises etc.

All reports are presented to a plenary session, and after discussion, either the institution is a public one, and the report is transmitted to the appropriate minister, who usually decides according to the suggestions of the commission, or the institution is private, and the decisions of the commission are directly applicable.

An article of the founding law states that the Commission can assess curricula, whenever requested, awarded by foreign institutions, and recognise to their degrees an equivalence as regards French regulations. This disposition has been ineffective for a long time, but is now used by some neighbouring institutions.

4) Bologna process

The French State generally strongly supports this process. Already several programmes and degrees exist or are being modified in the engineering field, namely:

Master Degree “BAC+5”³

The Master is already accepted by law in all engineering schools accredited by the CTI.

Doctorate Degree “BAC+8”

No change: already exists in this form

Bachelor Degree “BAC+3”

This is a real political success. From the beginning, the “Mouvement des Entreprises de France” (MEDEF), the French Federation of CEOs, and several other organisations have considered it as a chance for French universities. However, in technical fields and engineering, MEDEF and several other organisations have not accepted the Bachelor “BAC+3” because France already has an excellent “BAC+2”, like the “Brevet de Technicien Supérieur” (BTS) or the “Diplôme de l’Institut Universitaire Technologique” (IUT).

The main problem for the Ministry of Education and some parts of the society is the apparent incompatibility between the Preparatory Schools of 2 years and the Bachelor of 3 years.

However, it is easily possible to deliver a “Bachelor degree” to students that have accomplished three year of High Education, whatever the path they have followed (for instance : 2 years CPGE and one year in any school; or 2 years DEUG and one year in any school; etc.). But such a degree will not be regarded as a title of “Diplôme d’ingénieur”, and does not offer a normal way to enter in the active life as an “Ingénieur”.

Fact is that the Bachelor does not really exist for the French engineering schools today.

(Régis Lallement, modified by François TAILLY, November 2005)

³ Traditionally, in France the duration of HE programmes up to graduation is indicated by BAC (i.e. “Baccalaureat”) followed by the number of years.

11 GERMANY

From the traditional Diplom/Magister system to a two-cycle-degree structure

In the traditional German engineering education there was no formal procedure of accreditation, neither in the academic nor in the professional world. Study programmes were required to refer to special framework recommendations for the curriculum content and exams, published (and from time to time up-dated) by the 'The Standing Conference of the Ministers of Education and Cultural Affairs of the Laender in the Federal Republic of Germany' (abbr.: 'Kultusministerkonferenz [KMK]') and had to be approved by the respective Laender (State) Ministry. The traditional title 'Diplom-Ingenieur' is protected by law. Only the Technical Universities (TU) and Fachhochschulen (Universities of Applied Sciences – UAS) are entitled to award the degree 'Diplom-Ingenieur', in case of the Fachhochschulen in some States supplemented by (FH) in parenthesis. As part of the Bologna Process the traditional degrees are currently replaced by the degrees 'Bachelor or Master of Engineering', alternatively 'Bachelor or Master of Science'.

Academic degrees open immediate access to the professions in Germany according to the respective Higher Education Acts of the individual Federal States. Associations of engineers as the 'Verein Deutscher Ingenieure [VDI]' ('Association of German Engineers') and the 'Verband der Elektrotechnik, Elektronik, Informationstechnik e.V. [VDE]' ('Association for Electrical, Electronic & Information Technologies) are not entitled to deliver additional titles or permissions as the British Institutions do with the 'Chartered Engineer' and the 'Incorporated Engineer'.

The implementation of the two-cycle system with Bachelor's and Master's degrees in Germany was ratified by the amendment of the 'Framework Act for Higher Education' effective from 20 August 1998, amended by Art. 1 of the law effective from 8 August, 2002.

The implementation of Bachelor's and Master's degrees in Germany will not only replace the labels 'Diplom' and 'Magister', moreover it emerges a complete new system with newly designed study programmes. The Bachelor's and Master's degrees will be structured by a qualitative and quantifiable module system. The Bachelor degree will be also for Germany the first professional qualification after three years at the earliest. The overall student workload is measured by the European wide compatible credit point system ECTS.

As the operative instrument of quality assurance all new study programmes have to be accredited according to the Common structural guidelines of the Laender as set out in Article 9 Clause 2 of the 'Hochschulrahmengesetz [HRG]' (Framework Act for Higher Education) for the accreditation of Bachelor's and Master's study courses".

The Accreditation System

The Accreditation Council – www.accreditation-council.de

The need of quality assurance in the field of higher education in Germany was met by voluntary external quality evaluation procedures in some of the States and by implementing a compulsory programme accreditation system, starting with the foundation of the 'Accreditation Council' in 1998 in a pilot phase. The emerging accreditation system was confirmed by the KMK-resolution 'Future development of quality assurance in Germany across the Laender and across higher education institutions' effective from 1 March 2002. The statute came into effect commencing 1 January, 2003. The Accreditation Council was affiliated to the Kultusministerkonferenz [KMK].

As per law from 15 February 2005 the Accreditation Council was transformed into an independent 'Foundation for the Accreditation of Study Programmes in Germany'. The Foundation is responsible for comparable quality standards in the frame of a decentralised German accreditation system insofar as it does not execute programme accreditation itself but authorises special accreditation agencies, which perform this task based on the terms of a formalised and objectified procedure, following the international patterns for external review procedures as recently specified by the 'European Association for Quality Assurance in Higher Education [ENQA]' in its 'European Standards and Guidelines [ESG] for Quality Assurance'. In case of a positive review and

assessment the particular study programmes is awarded the certificate of the Accreditation Foundation. For the accreditation of study programmes an open-loop reference framework was developed which has to be concretised specifically through the accreditation process by the particular peer review. The agencies executing the accreditation procedures have detailed the various steps and requirements necessary to arrive at a successful programme accreditation, often including generic and subject specific programme outcomes. Programme providers must make evident that these outcomes are achieved. The expert teams play a key role as they – based on the study of a self-report and the results of a site-visit and auditing process – have to formulate a proposal for the respective accreditation commission whether or not or under which additional conditions a programme should be accredited. Normally these review teams consist of four to five members, besides of up to three professors from a University or University of Applied Sciences a student representative and a representative of the professional practice is involved. The accreditation process in general is based on the principles of assuring quality, verifying the feasibility of study programmes and required outcomes, facilitating diversity and creating transparency.

The Accreditation Council also functions as a documentation centre for accreditation of study programmes and it governs data on the in Germany accredited study programmes.

The organs of the foundation are

- the Accreditation Council,
- the Board,
- the Foundation Council.

Apart from the accreditation of study programmes of state and officially recognised (non-state) institutions of higher education, the Laender also use the instrument of institutional accreditation for quality assurance at non-state institutions of higher education, which is executed by the 'Wissenschaftsrat' (Science Council).

Currently a KMK forced debate is under way focusing on the question whether the compulsory accreditation, covering merely all the round about 11.000 study programmes in Germany, could be replaced in the near future by an institutional audit, or more specific a system accreditation focused on the quality assurance system of each higher education institution in general, not of a specific programme or programme provider.

International Co-operation

The successful development of a 'European Higher Education Area' cannot be realised without strong international co-operation. From this need arose a wide network of international organisations and activities in the field of quality assurance for higher education, where the Foundation for Accreditation of Study Programmes in Germany is linked in. The foundation is member of the most important European and international accreditation institutions.

Austrian, Swiss and German accreditation councils and agencies form the German-speaking network D-A-CH with the objective of mutual recognition of accreditation.

The foundation is also member of the 'European Consortium for Accreditation in Higher Education [ECA], which is a pool of institutions with comparable accreditation systems and which is aiming the development of mutual recognition within European frame.

The foundation is furthermore member of the European umbrella organisation 'European Association for Quality Assurance in Higher Education [ENQA]'. With reference to the Bologna-Process ENQA is assigned by the member states' ministers to work out European standards and guidelines for quality assurance as well as peer review procedures for accreditation organisations, in which the national frames and the autonomy and particular responsibilities should persist.

The membership of the 'International Network for Quality Assurance in Higher Education [INQAAHE]' extends the networking to world-wide international co-operation.

Accreditation Agencies

The Accreditation Agencies are responsible for the accreditation of degree courses. Accreditation is based on the principles of assuring quality, verifying the feasibility of study courses, facilitating diversity and enhancing transparency. The review process carried out on the basis of specialist-content criteria aims to address the question of whether a degree course provides a logical and coherent picture as far as the goals are concerned which have been set and are to be achieved.

At present the following six Agencies are authorised by the Accreditation Council to provide accreditation of study programmes, three of them (ASIIN, FIBAA, AHGPS) focused on particular disciplines and subject areas, the three others covering all kinds of study programmes.

ASIIN: Akkreditierungsagentur für Studiengänge der Ingenieurwissenschaften, der Informatik, der Naturwissenschaften und der Mathematik (Accreditation Agency for Study Programmes in Engineering, Informatics, Natural Sciences and Mathematics); www.asiin.de

ASIIN was founded on 19 September, 2002 by amalgamating two former accreditation agencies: ASII (in the fields of Engineering and Information Technology) and A-CBC (in the fields of Chemistry, Biochemistry, and Chemical Engineering) as well as expanding to all fields of study in natural sciences and mathematics. This extension facilitates the accreditation of interdisciplinary study programs merging two fields of studies in engineering and science (double degree courses or 'hyphenated' study programmes).

Profile: Accreditation of Bachelor and Master degree courses in fields of study of engineering, information technology, natural sciences, and mathematics. ASIIN is the only German accreditation agency explicitly specialised in accrediting degree programmes in these subject areas.

As organisation, ASIIN represents competences in the following disciplines:

- Mechanical Engineering / Process Engineering
- Civil Engineering / Surveying / Architecture
- City Planning and Spatial Planning
- Physical Technologies, Materials and Processes
- Agronom / Nutritional Science / Landscape Architecture
- Life Sciences
- Physics
- Electrical Engineering / IT
- Informatics / Computer Science
- Business Informatics / Information Systems
- Industrial Engineering
- Chemistry
- Geosciences
- Mathematics

In these 13 subject areas ASIIN has established 13 Technical Committees, responsible for the definition of subject specific criteria for the respective study programmes and the proposal of the audit teams running the review processes including the site visits. The accreditation decisions are finally taken by the ASIIN Accreditation Commission based on the votes of the nominated audit team and the respective Technical Committee. A positive accreditation decision testifies that the study programme satisfies the ASIIN accreditation requirements and procedures which include among others a set of outcomes oriented quality standards in accordance with the German and the European Qualifications Framework and the criteria and standards of the EUR-ACE label.

ASIIN is a member of 'European Network for the Accreditation of Engineering Education [ENAE]' which is currently implementing and running EUR-ACE as a European label for accredited and mutually recognized study programmes in engineering. ASIIN is also since 2003 a provisional member of the Washington Accord, expecting full membership in 2007 with the result that its accredited programmes would be mutually recognized by the other ten member agencies from all over the world, including e. g. USA, Canada, Australia, Japan, South-Africa, and from Europe UK

and Ireland. ASIIN is also a member of the 'European Association for Quality Assurance agencies [ENQUA]'. Since 01 January, 2006, ASIIN has been included in the list of visiting and assessing bodies authorised by the 'Niederlands-Vlaamse Accreditatie Organisatie [NVAO]'. Based on a mutual agreement or a Memorandum of Understanding ASIIN is also collaborating with the USA 'Accreditation Board for Engineering and Technology [ABET/Inc.]', and the French 'Commission des Titres d'Ingénieur [CTI]'.

ZEVA: Zentrale Evaluations- und Akkreditierungsagentur Hannover (Central Evaluation and Accreditation Agency Hanover). www.zeva.uni-hannover.de

ZeVA was established in 1995 by the State University Conference ('Landes-Hochschul-Konferenz [LHK]') as 'Central Evaluation Agency of the Lower Saxon Universities [ZEVA]'. After establishing an organisational independent division of accreditation the agency was renamed in 2000 to 'Central Evaluation and Accreditation Agency of Hanover [ZEVA]'.

Profile: Accreditation of Bachelor and Master degree courses in all fields of study. Accreditation of newly designed courses of study yielding a Diploma or Magister degree, respectively, if no framework regulations for academic studies and examinations do exist or are no longer valid.

FIBAA: Foundation for International Business Administration Accreditation. www.fibaa.de

Profile: Accreditation of Bachelor and Master degree courses in fields of study Business Administration and related fields. Accreditation of newly designed courses of study yielding a Diploma or Magister degree, respectively, if no framework regulations for academic studies and examinations do exist or are no longer valid

ACQUIN: Akkreditierungs-, Zertifizierungs- und Qualitätssicherungs-Institut. Accreditation, (Certification and Quality Assurance Institute). www.acquin.de

Profile: Accreditation of Bachelor and Master degree courses in all fields of study. Accreditation of newly designed courses of study yielding a Diploma or Magister degree, respectively, if no framework regulations for academic studies and examinations do exist or are no longer valid.

AHGPS: Akkreditierungsagentur für Studiengänge in Bereich Heilpädagogik, Pflege, Gesundheit und Soziale Arbeit e.V. (Accreditation Agency for Study Programmes in Special Education, Care, Health Sciences and Social Work). www.ahpgs.de

Profile of agency: Accreditation of Bachelor and Master degree courses study programs in special needs education, care, health and social work. Accreditation of newly designed courses of study yielding a Diploma or Magister degree, respectively, if no framework regulations for academic studies and examinations do exist or are no longer valid.

AQAS: Agentur für Qualitätssicherung durch Akkreditierung von Studiengängen (Agency for Quality Assurance by Accreditation of Study Programmes). www.aqas.de

Profile: Accreditation of Bachelor and Master degree courses in all fields of study. Accreditation of newly designed courses of study yielding a Diploma or Magister degree, respectively, if no framework regulations for academic studies and examinations do exist or are no longer valid.

(G.Heitmann, G.Kurz, 03/05/2007)

12 GREECE

In Greece the engineering academic title “Graduated Engineer” (Diplomatouchos Michanicos) followed by the respective specialization is protected by the law no.1477/1938; only an Engineering Department belonging to one of the Technical Universities or Faculties of Engineering in Universities (AEI) are allowed to award this title. The Technical Universities or the respective Faculties of Engineering are the Technical University in Athens (National Metsovion TU), the Faculty of Engineering of the Aristotle University of Thessaloniki, the Faculty of Engineering of the University of Patras, the Faculty of Engineering of the Democritus University of Thrace, the Faculty of Engineering of the University of Thessaly in Volos and the Technical University of Crete.

The equivalence of foreign academic titles with the previous title of Graduate Engineer is granted by DOATAP (previously DIKATSA) (Inter-university Centre for the Recognition of Foreign Titles of Studies) being the competent authority for the recognition of diplomas of foreign Universities. As all Greek Engineering Faculties offer curricula of 5 years for the first degree (diploma), equivalence is given only to those diplomas from abroad that have a similar total duration of studies. For degrees of duration being less than 5 years, the candidate has to follow and pass exams in additional courses so that equivalence to be granted.

The accreditation and admission to the profession of engineer in Greece is responsibility of the Technical Chamber of Greece (TEE), established to “advance the education and training of engineers and to promote the science of and practice of engineering for the public benefit”. TEE has the right and the duty to evaluate the adequacy of the graduate’s preparation to start on a professional career.

To this effect, it awards the “Permission of Exercising the Profession of Engineer” under the fulfilment of two prerequisites:

- A “Graduated Engineer” diploma, obtained (as previously explained) after a 5-year engineering curriculum or an equivalent foreign title;
- An examination organized and run by the TEE. During this exam, a panel composed usually of three engineers (a University Professor, an engineer from a construction or industrial firm and an engineer from a design office) checks the applicant’s Diploma Thesis and his ability to confront several professional problems. Alternatively, the candidate can choose to be examined on three specific topics chosen by himself. After passing successfully this exam, the applicant is enrolled to the TEE.

Once the “Permission of Exercising the Profession of Engineer” is granted to a graduate engineer, this remains valid for his whole professional life.

It is to be noted that no similar examination procedure and acceptance exists till now for graduates from the short-cycle (3 years) engineering curricula provided by the Technological Institutes (TEI), a fact that leads to lack of established “professional rights” for these graduates.

With regard to Quality Assurance in Higher Education, a law establishing a national system has been voted by the Greek parliament in August 2005 and is now under implementation. The QA system will be composed of two levels: a) internal assessment and b) external evaluation and review schemes.

Higher education institutions will have to set up their own internal QA mechanisms to provide a sound basis for external evaluation. The aim is to effectively combine institutional autonomy and accountability within the national quality regulations framework. Each institution has the right to independent decision making and therefore is responsible for devising its own QA system for assessing the education, administrative and research functions. However, general provisions are provided by law. Furthermore, teaching staff, administration personnel and students are foreseen as the main participants and contributors to this process.

A single national agency will be in charge of QA in higher education. It will aim at quality improvement through external evaluation. One of the main tasks of the agency will be to develop a

set of standards, procedures and guidelines on quality assurance. In order to define objective external criteria and methodologies, the mission and aims assigned to each institution will be taken into account as well as its specific characteristic and orientations.

With the same law, the legal framework for the introduction of the European Credit Transfer System (ECTS) in all undergraduate and postgraduate higher education study programmes and the Diploma Supplement have been established.

(C.Baniotopoulos, updated 7/7/2007; additional note on QA by A.Avdelas, 28/8/2007

5.1.13 HUNGARY

The accreditation system in Hungary is classified into the categories of institution and programme accreditations. The Prime Minister based on the recommendation of the Minister of Education established a Hungarian Accreditation Committee for Higher Education (HAC) that has permanent members and invited experts regarding the engineering fields concerned. HAC submits its recommendation to the Minister who makes the decision that is usually in harmony with the submission with few exemptions (e.g. the respective committee has some different arguments and the recommendation is not clear).

The Hungarian Accreditation Committee for Higher Education (HAC)

- contributes to the preparation of principles for quality insurance policy of the higher education sector and monitors its implementation,
- provides professional support to the preparation of quality development programmes of higher education institutions and to their operation,
- implements the targets for the quality certifications concerning the establishment of institutions and their operation,
- submits proposals for the requirements of full or ordinary university professor positions,
- monitors the harmonisation of quality development system of the sector with the higher education systems, in the European Higher Education Area,
- declares point of view after approached by the higher education institution on creative activities in education, scientific research and arts,
- gives expert point of view on the initiation/introduction of bachelor and master programmes, establishment of doctoral school, introduction of doctoral PhD programme and on the PhD rules and regulations,
- provides opinion at the request of the higher education institution for awarding university professor position or title,
- provides and publishes the list of experts' name in higher education.

(i) **Engineering Faculty and University accreditation** takes place usually in every 5th year at individual academic, Department, Faculty and University levels.

- a) At least six months before the appointed sub Committee will start with the investigation each respective academic has to prepare the list of publications in the past 5 to 6 years, the courses (full-time, part-time, etc.) taught indicating briefly the theory, practice, hours per week, nature of examination (oral, written test or both, laboratory performance), participation in the supervision of students' projects, final examinations, then the output of research activity, memberships in national and international education/scientific bodies, participation in national/international conferences/symposiums/workshops/seminars and the nature of participation (session chairperson, poster/paper presentation, etc.)
- b) At Department level the reports of individual academic staff members will be integrated and as an introduction the activities of the Department are described in the fields of education, scientific research, national and international projects, industry-academia link development, new programmes introduction and running, staff development, teaching methods applied, new significant equipment purchased, human resources and facilities of laboratories and workshops, the Department's role in the respective national and international area, demonstration of various activities in addition to the undergraduate and graduate levels (with PhD programmes inclusive) like continuing education, organisation of national-international events and other facts presenting the vivid link between the Department and professional organisations, companies, agencies, societies both in Hungary and abroad. Great emphasise should be put on the international recognition and its demonstration. The full reports of the Departments are submitted to the Dean of the Faculty.

- c) At Faculty level the reports are integrated with the introduction of the Faculty activities on how they are serving the long-term strategy of the University and the intentions of the government. This report having few hundred pages are sent to the HAC for consideration. At least 6-months time is needed for the respective HAC members to study thoroughly the full report.
- d) At University level the full report are investigated and harmonised, if needed, to the University medium- and long-term strategies.
- e) Respective HAC sub-committee investigates on how the report and reality are in harmony by meetings with the Vice Chancellor, its Deputies if needed, the Dean, Directors of the Departments plus groups of academics and students. Informal interviews, observation of lecture presentations, laboratory/workshop practice, projects, etc. provide a clear picture to the Committee. Such a visit takes place for three days as an average and after the completion of the visit the Committee prepares its evaluation report and submits it to the Minister. Feedback will come back from the Minister with recommendations which areas should be improved in more efficient and more successful way. If serious lacks are observed the accreditation can be received after the implementation of all recommendations.

(ii) New programme initiation and its introduction needs two accreditation procedures. The new programme accreditation is due to rapid technological development and the proposal is submitted by the Vice Chancellor to the Minister and to the HAC.

- a) The reasons for the initiation of the new programme(s) should be based on industry, company, organisation requests giving arguments for the need of graduates in this new field and their approximate numbers per annum. Priority is given to those new programmes introduced by two or more higher engineering education institutions bearing in mind that such a programme will facilitate both academic staff and students' activities. The programme initiation should be accredited only by once, before its introduction.
 - b) The introduction of the new programmes must also be accredited and the deviation from the approved new programme can not exceed 30%.
 - c) The Faculty in co-operation with the Departments prepares the curriculum, brief syllabi with the objectives of the programme, available staff, premises, equipment, infrastructure needed for smooth running.
 - d) Special Committee of HAC is investigating the proposal and if needed envisages interviews with University leaders and high-ranking industry personnel as well in order to clarify the future of the new programme. International experts are invited particularly for new PhD programme initiation.
 - e) If HAC would recommend additional information e.g. recommended teaching materials, laboratory equipment, the information flow will be effective. If all required prerequisites are available the new programme will have green light.
 - f) The respective Department prepares and submits each year a self-evaluation report on the experiences of the new programme running with the difficulties, their rectification, favourable changes in updating the programme, new staff recruitment, new laboratory/workshop practice introduction, new teaching material production, etc.
- (iii) In 2001 HAC evaluated the first time the applications for the new full-time professor positions. Its recommendations initiated long debates because the Universities had the

idea that their autonomy was broken. The problem was rectified step by step and by now both parties, such as HAC and the institution could conclude in agreement.

(Laszlo Szentirmai, 27/03/2007)

14 ICELAND

The engineering degree courses are regulated by a set of regulations produced by the Icelandic Ministry of Education.

Graduates of the *tæknifrædi* programme (3½ year) may continue studying for two further years to obtain the *verkfrædi* degree (5 year). The 5 year *verkfrædi* degree is in 2 modules, 3 year BS degree and a 2 year MS degree according to the Bologna declaration. The two systems are not totally harmonized to a one string system, but a compromise between tradition and internationalism.

The Ministry of Industry and the Association of Chartered Engineers in Iceland (VFI) have agreed to use the following rules as a basis upon assessing applications for permission to call oneself a Chartered Engineer, cf. Art. 1 – 3 of Act No. 8/1996 respecting the Authorization of Several Professional Titles of Specialists in Technical and Design Faculties as the Act has been amended.

The assessment by VFI's Education Committee is based on the Association's requirements for applicants' education. The Education Committee shall recommend that an applicant obtain the Minister's permission to call himself a Chartered Engineer if the following conditions are met:-

- Completed examination degree study at a University or Technical College which the Education Committee deem capable of granting satisfactory education in the speciality field concerned. The examination degree shall be in duration and composition comparable to a Master examination in engineering and shall meet the following minimum requirements of VFI (each unit corresponding to one week of full study):-

a)	Core Courses of engineering	25 units
b)	Engineering core courses	25 units
c)	Engineering specialization	60 units

- In addition thereto there shall be subjects of free choice which may be considered to comprise study of engineering and these shall form part of a flawless study and the total length of the study, organized in a formal manner, for no less than four years and a half.

(*Sigurdur Brynjolfsson, 14/11/04*)

15 IRELAND

All Engineering Degrees are awarded either by Universities or the National Council for Educational Awards (NCEA). Each of those awarding bodies has their own procedures for academic recognition and accreditation of courses. The Government has also recently granted Degree awarding powers to several Institutes of Technology.

External Examiners are appointed to all engineering examinations by the universities, Institutes of Technology or the NCEA, as appropriate. They are obliged under contract to ensure adequacy of standards in examinations. They also often act as advisers on course design.

The statutory body for the professional accreditation of Engineering Degrees in Ireland is the Institution of Engineers of Ireland (IEI). Government legislation has decreed that only the IEI may award the title of Chartered Engineer.

All Engineering Degrees, which are to be considered eligible for Chartered Engineer status are subject to the accreditation of the IEI. This generally takes place every 5 years and consists of a detailed evaluation of such Degrees by Assessors of the Institution. These Assessors are taken from Universities both in Ireland and abroad together with representatives of industry.

(Ivan Gibson, 31/03/2003)

18 ITALY

Study Organisation

In Italy, University degrees and curricula are fixed by national rules, within limits that have been much relaxed by recent laws, but are still rather strict if compared to other European countries. These rules applies to public and private Universities.

Before the Bologna process, Italian Faculties offered two kinds of programmes in parallel: three-year "*Diploma*" programmes (1st-level programmes) and five-year "*Laurea*" programmes (2nd-level programmes), the last one enabling students to access doctorate programmes.

Laurea programmes were long established programmes. On the contrary, the *Diploma* programmes were introduced only in 1990 and implemented in the academic year 1992/93, after a long debate developed mainly in the second half of eighties and carried out above all by the Engineering Faculties, the most interested ones to the introduction of such programmes.

The present study organisation has been established by a Ministerial Decree of November 1999. It applies very schematically the "Bologna Declaration" approach, by introducing a rigid structure of degrees in series (the so called "3+2" structure) throughout all university education: it is compulsory since academic year 2001-2002, but it has been introduced one or two years earlier by some Engineering Faculties.

According to this law, all University students obtain first the *Laurea* after a three-year programme; only afterwards they may apply for two further years of study, leading to the *Laurea Specialistica*, which enables students to access doctorate programmes. Only disciplines for which there exist special European Community Directives (in particular Architecture, and consequently Architectural Engineering) are not obliged to follow this pattern.

For both *Laurea* and *Laurea specialistica* programmes:

- programme titles are established by the programme itself and must belong to one of the "classes" of programmes defined by law;
- curricula are defined by the programme, but in compliance with minimum contents established by law;
- didactic activities are measured in terms of ECTS Credit System and the calendar is in semesters.

The general (i.e valid in any cultural area) educational objectives of *Laurea* and *Laurea Specialistica* programmes have been defined as follows:

- the educational objective of *Laurea* Programmes is to supply students with specific professional skills and adequate mastering of general scientific methods and contents;
- the educational objectives of *Laurea Specialistica* Programmes is to supply students with advanced level education for high quality activities in specific areas.

The "classes" to which the *Laurea* programmes in Engineering may belong are 4 (Architecture and Building Engineering, Civil and Environmental Engineering, Information Engineering, Industrial Engineering), while those of the *Laurea Specialistica* programmes are 17 (Architecture and Building Engineering, Aerospace Engineering, Biomedical Engineering, Chemical Engineering, Civil Engineering, Automation Engineering, Telecommunication Engineering, Electrical Engineering, Electronic Engineering, Energetic and Nuclear Engineering, Management Engineering, Computer Science Engineering, Mechanical Engineering, Naval Engineering, Environmental Engineering, Mathematical-Physical Modelling for Engineering, Material Science and Engineering).

The educational objectives specific of the *Laurea* and *Laurea Specialistica* programmes in Engineering, established by law in terms of "programme outcomes", are quite similar independently of the class they belong to. The educational objectives of *Laurea* Programmes are:

- appropriate knowledge and understanding of the methodological-operative aspects of mathematics and of the other basic sciences and ability to apply such knowledge and understanding for the interpretation and description of engineering problems;

- appropriate knowledge and understanding of the methodological-operative aspects of engineering sciences, both in general and in-depth for the disciplines characterising each programme, and ability to identify, formulate and solve problems in such disciplines by using up-to-date methods, techniques and instruments;
- ability to use (standard) techniques and tools to design components, systems, processes;
- ability to conduct (simple) experiments as well as to analyse and interpret data;
- understanding of the impact of engineering solutions on the social and physical-environmental context;
- knowledge and understanding of professional and ethical responsibilities;
- knowledge and understanding of businesses and business practices in their economic, managerial and organisational aspects;
- knowledge of contemporary issues;
- ability to work in team and leadership;
- ability to communicate effectively, both in writing and in speaking, in at least another language of the EU, besides Italian;
- the broad education necessary for and the ability to engage in life-long learning;

while those of *Laurea Specialistica* programmes are:

- appropriate knowledge and understanding of the theoretical-scientific aspects of mathematics and of the other basic sciences and ability to apply such knowledge and understanding for the interpretation and description of complex or interdisciplinary engineering problems;
- appropriate knowledge and understanding of the theoretical-scientific aspects of engineering sciences, both in general and in-depth for the disciplines characterising each programme, and ability to identify, formulate and solve complex or interdisciplinary problems in such disciplines, also in an innovative way;
- ability to devise, plan, design and manage complex and/or innovative systems, processes, services;
- ability to design and manage highly complex experiments;
- more advanced knowledge and understanding of context and more advanced transferable skills if compared with those acquired in the *Laurea* programme.

The didactic engagement of the students over the three years of *Laurea* programmes has to amount to 180 ECTS credits (1 credit corresponds to 25 hours of working load). The syllabus must contain:

- at least 27 credits reserved to basic scientific disciplines (mathematics, informatics, statistics, physics, chemistry);
- at least 36 credits reserved to disciplines characterising each programme (in this regard disciplines are grouped into definite “disciplinary areas”);
- at least 18 credits reserved to either connected or integrative disciplines (i.e. all the disciplines not defined as characterising);
- at least 9 credits for the final test and the knowledge of a European language different from Italian;
- at least 9 credits aimed at the progression of graduates to employment;
- at least 9 credits in the students' choice.

The didactic engagement of the students over the two years of *Laurea Specialistica* programmes has to amount to 120 ECTS credits. The syllabus, comprehensive of the 180 credits recognised from the 1st level studies, must contain:

- at least 50 credits reserved to basic scientific disciplines;
- at least 68 credits reserved to disciplines characterising each programme;
- at least 32 credits reserved to either connected or integrative disciplines;
- at least 15 credits for the final test;
- at least 18 credits aimed at the progression of graduates to employment;
- at least 15 credits in the students' choice.

The study organisation established by the Decree of November 1999 has been reformed by a new Ministerial Decree which will become operative from academic year 2008/09.

The main differences with respect to present study organisation are:

- the *Laurea specialistica* has been renamed *Laurea magistrale*;
- the general educational objectives of the *Laurea* programmes have been redefined as follows: “*Laurea programmes have the aim to supply student with adequate mastering of scientific methods and contents, even when oriented to the acquisition of specific professional competences*”;
- the class in Safety Engineering has been added to the classes of the *Laurea Magistrale* programmes;
- the number of credits fixed by law has been revised. In particular, the syllabus of the *Laurea* programmes shall contain:
 - at least 36 credits reserved to basic scientific disciplines;
 - at least 45 credits reserved to disciplines characterising each programme;
 - at least 18 credits reserved to either connected or integrative disciplines;
 - at least 12 credits in the students' choice;while the syllabus of the *Laurea magistrale* programmes shall contain:
 - at least 45 credits reserved to basic scientific disciplines;
 - at least 12 credits reserved to either connected or integrative disciplines;
 - at least 8 credits in the students' choice.

The new reform will be operative from academic year 2008/09 and shall be implemented within academic year 2010/2011.

Accreditation and Quality Assessment

In Italy, all degrees awarded by public and private recognised Universities have “legal value” or “legal validity”. This means that degrees have double juridical significance:

- according to the specific legislation regulating Higher Education, they automatically provide “certified evidence” of the levels of cultural and scientific education achieved by students;
- within the general legal system, they constitute the essential pre-requisite for exercising of certain professional activities or for access to employment in the public sector.

As a consequence, no need for accreditation was, until recently, felt; so, at the moment, in Italy it doesn't exist an accreditation system. Implementation of programmes only requires an “authorisation” by the Ministry of University and Research, subject to the fulfilment of some minimum requirements, established by the Ministry itself on proposal of the National Committee of Evaluation of University System (CNVSU), which is a consultant of the Ministry.

At the moment, the minimum requirements regard fundamentally:

- the availability of a minimum number of university lecturers competent in the disciplines characterising the programme, established by law;
- the availability of facilities (lesson rooms, laboratories, libraries), certified by the University;
- the maximum number of students per teaching module, established by law.

When the reform of the present study organisation will be implemented (i.e. starting with academic year 2008/09), the necessary requirements (no more “minimum requirements”) shall regard:

- the transparency rules and the necessary condition for a correct communication towards students and all the other stakeholders, relative to the programme characteristics;
- the standards for programme quality assurance;
- the resources of university lecturers which must be available to sustain the programmes, with reference to the characterising scientific-disciplinary sectors;
- the dimensional rules relative to the students who can be enrolled in each programme;
- the procedures that Universities and Minister have to carry out;
- particular rules relative to Universities of new institution and private Universities.

However, the process of didactic autonomy in progress (even if not a “complete” autonomy) and even more the harmonisation process of Higher Education in Europe promoted by the Bologna process have stimulated attention on programme accreditation also in Italy.

This is evidenced by the Regulations recently established relative to the institution of the National Agency for Evaluation of University and Research (ANVUR), which attribute to the new Agency

the responsibility for programme accreditation. As a matter of fact, art. 6 of such Regulations states that: *“In order to contribute to assure the initial quality of didactic activities, ... the Agency determines quantitative and qualitative requirements, in terms of constant human resources, infra-structural resources and financial resources, of adequacy of programme contents ..., which are mandatory ... for the establishment of any University programme,...”* .

The new Agency will have also the responsibility to carry out activities regarding programme quality assessment. In fact, another article of the Regulations states that: *“The Agency carries out at a national level the activities regarding the external assessment of the quality, efficiency and effectiveness of the didactic activities of each University, For the programme assessment the Agency utilises ... in particular the analysis and comparison of qualitative and quantitative indicators, the result of the self-assessment processes, and the external assessment reports prepared by expert assessors in comparison with the self-assessment reports and taking into account the results of assessment visits. ...”* .

In Italy it has been by now accumulated a great experience on quality assessment of programmes, mainly thanks to the activity of the Conference of the Rectors of Italian Universities (CRUI).

On the basis of the experiences from programme quality assessment made by CRUI so far, a “Management System for Quality of University Programmes” has been defined, whose characteristics are by now shared at a national level. It assumes that a programme can be considered a “quality programme” when:

- its management system is suitable, adequate and effective and it offers to all interested parties full, updated, easily acquired information about its objectives, educational process, resources and results;
- educational objectives and programme outcomes are “of value”, i.e. they are consistent with each other and with the needs of interested parties;
- human resources, facilities, financial resources and cooperation agreements with businesses, research institutions and other Higher Education Institutions are adequate to accomplish programme outcomes;
- the educational process (curriculum and related processes) is adequate to accomplish programme outcomes;
- it systematically monitors the processes for the programme management, analyses its results and promotes continual improvement of the effectiveness of management processes and of their results.

Engineering Profession

In Italy engineering profession is regulated by law: engineers must be members of the “Ordine degli Ingegneri” of the Province of residence (but the compulsory membership is often eluded by engineers employed by Industry, who do not have “to sign” any professional document).

Before the reform of the study organisation according to the Bologna process, the “Albo degli Ingegneri” (i.e. the list of Professional Engineers kept by each “Ordine”) was still unique, notwithstanding the strong curricular differences (and professional tasks) between the engineering branches.

After the general reform of the University degrees as a consequence of the Bologna process, the “Albo degli Ingegneri” has been divided into two “Sections”: Section B for people holding a three-year Laurea (called “Ingegneri Junior”) and Section A for people holding a “Laurea specialistica” (called “Ingegneri”). With the occasion, each Section has been also subdivided into three “Sectors”: Civil and Environmental Engineers, Industrial Engineers, Information Engineers.

The activities of engineer profession are shared among the three sectors as follows:

- for the “Civil and Environmental Engineering” sector: planning, design, development, work management, appraisal, proof tests, management, assessment of environmental impact of building works, territorial and transportation structures and infrastructures, soil defence and antipollution and depuration works, geotechnical works, civil and environmental systems and

plants;

- for the “Industrial Engineering” sector: planning, design, development, work management, appraisal, acceptance test, management, assessment of environmental impact of machines, industrial plants for energy production, transformation and distribution, industrial and technological systems and processes, devices and instrumentation for diagnostics and medical-surgical therapy;
- for the “Information Engineering” sector: planning, design, development, work management, appraisal, acceptance test, management of electronic, automation and electric generation, transmission and information processing plants and systems.

Professional activities of engineers enrolled in Section A involve use of advanced, innovative or experimental methodologies in the design, work management, appraisal and test of complex and innovative structures, systems and processes.

The object of the professional activity of engineers enrolled in Section B are:

- for the Civil and Environmental sector:
 - contribution and cooperation in activities based on science application, related to design, work management, appraisal and proof tests of building works, including public works;
 - design, work management, surveillance, bookkeeping, accounting relative to simple civil constructions, using standardised methodologies;
 - direct and instrumental surveying on new and historical buildings and geometrical surveys of any kind;
- for the Industrial sector:
 - contribution and cooperation in activities based on science application, related to design, work management, appraisal and proof tests of machines and plants, including public works;
 - direct and instrumental surveys of technical parameters relative to machines and plants;
 - activities which imply use of standardised methodologies, as design, work management and test of single parts or components of machines, plants and systems, and of systems and processes of simple and repetitive typology;
- for the Information sector:
 - contribution and cooperation in activities based on science application, related to design, work management, appraisal and test of electronic, automation and electric generation, transmission and information processing plants and systems;
 - direct and instrumental surveys of technical parameters relative to electronic plants and systems;
 - activities which imply use of standardised methodologies, as design, work management and test of single parts or components of electronic, automation and electric generation, transmission and information processing plants and systems, and of systems and processes of simple and repetitive typology.

The right to be admitted into either Section of the “Ordine” is gained by passing a “State Professional Examination”, that can be sustained soon after the award of the respective University degree. It consists in two written tests of general character, a practical test and an oral test.

(Alfredo Squarzoni, 02/08/07)

17 LITHUANIA

The procedure for accreditation of higher education programmes in Lithuania has been approved by the Minister of education and Science in 2004.

The procedure regulates adopting a resolution on how the higher education study programme (further on referred to as Programme) complies with the requirements of legal acts and how the programmes are accredited.

The Programmes are valued in compliance with the valuation rules prescribed by the institutions of Science and Studies.

The resolution in the form of an order is adopted by the Minister of Education and Science on the proposal of the Study Department under the Ministry of Education and Science (further on referred to as Department).

The draft resolution is presented by the Department with reference to the conclusions made by the experts of the Centre for Quality Assessment in Higher Education.

Adoption of resolution

1. On evaluation of the programme one of the following resolutions for the national accreditation of the programme can be adopted:

- to accredit a programme;
- to accredit a programme conditionally, i.e. setting the term of accreditation not exceeding the study period of the programme;
- restrictive accreditation of a programme.

2. The resolution to accredit a programme is adopted if the programme and its execution are in compliance with the provisions of Consecutive Studies (further on Provisions) and requirements of the regulations of the relevant branch of studies (further on Regulations). The accreditation is valid until the next outside valuation on the programme.

3. The resolution for conditionally accreditation is adopted if the programme or its execution are not in compliance with a part of the requirements prescribed by Provisions and Regulations, but the institution has been taking measures to improve the quality of the study programme.

4. The resolution for restrictive accreditation the programme is adopted:

- If the programme or its execution do not comply with most of the requirements prescribed by Provisions and Regulations, setting the term of accreditation not exceeding the study period of the programme

Information on the resolution

After the Minister issues an order subject to the accredited programme, the Department:

- shall send out the copies of the order to all higher schools and the Centre for Quality Assessment in Higher Education
- has the order published in the newspaper "Valstybės žinios".

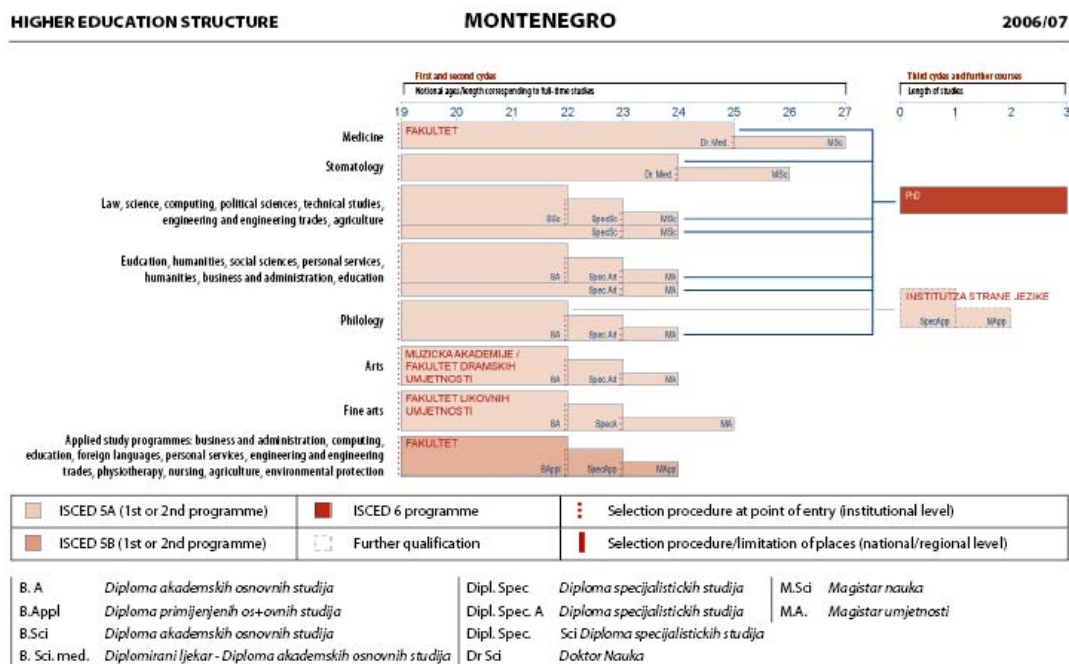
On the basis of the order the Register Department of the Ministry of Education and Science shall make an entry in the Register of Study and Educational Programmes that the relevant programme is "accredited" or "provisionally accredited until (the term as written in the order)" and the date and number of the order.

(Daiva Dumciuvienė, 03/04/2007)

5.1.18 MONTENEGRO

Montenegro has participated in Bologna Process since 2003 and became a full member from May 2007.

Scheme of the Educational System



1. Legislation

In October 22, 2003 Assembly of Montenegro adopted the new Law on Higher Education, which was created in accordance with Bologna Declaration objectives.

The overall goal of the Law is to enable to higher education institutions in Montenegro maximal autonomy in activities, particularly in academic field with minimal mediation of the state, except when so is requested for the purpose of protecting public interest. Also, the aim is to enable that the mission of the University becomes to educate young people to be qualified citizens in democratic society and qualified workforce in European labour market and that this is delivered in compliance with new European standards.

In Montenegro there are one public university – University of Montenegro (which enrolls 90% of students), one private university and several private faculties. Statute of University of Montenegro was adopted in January 2004. All these documents were made in line with Bologna process. The first generation of students have been enrolled in academic year 2004/2005 according to the new rules in accordance with the objectives of Bologna Declaration.

2. National organization

Ministry of Education and Science of Montenegro is responsible for overall education policy in Montenegro.

Higher Education Council shall be responsible for achieving high quality higher education in the Republic of Montenegro.

3. Quality assurance

The national body responsible for QA is the Council for Higher Education, nominated by the Government.

The Council analyses the state and achievements in higher education, gives professional proposals to the Government for the improvement of higher education area, and in this regard has the following special authorities:

(a) to prepare the starting points for shaping the proposal of national higher education strategy;

(b) to define the basic standards and norms for granting licenses and give opinion to the Ministry on awarding, altering or revoking of a license;

(c) to give opinion for measures for appointment of academic staff;

(d) to give opinion in the procedure for determining norms for higher education financing;

(e) determines measures for the assessment of study programmes from the view of their international comparability and duration of studies;

(f) undertakes periodical controls of licensed institutions quality and issues certificate on accreditation and reaccreditation; (g) undertakes periodical assessment of the quality of courses and programmes delivered by accredited institutions; (h) gives professional opinion and makes proposals to the Government depending on quality assessment, for financing of higher education institutions and assistance to students attending courses or programmes with institutions; (f) performs other activities prescribed by this law and foundation enactment.

The Council is particularly responsible for promotion of higher education quality in Montenegro.

Through the processes of licensing, quality assessment and accreditation, in accordance with professional and transparent methods, the Council assists higher education institutions in developing their possibilities and improving and maintaining the quality of their activities.

The Council shall form special commissions for evaluation and accreditation of institutions, and study programmes, and for certain fields of its activities, the Council may form the working entities, commissions and independent expert groups.

Foreign experts may be appointed as the members of the special commissions for evaluation and accreditation, and study programmes.

The Council comprises of 11 members appointed by the Government for a period of six years. The Council is made up of eight representatives who are prominent experts in the field of higher education, science and technology, proposed by the University and Academy of sciences and arts, and three representatives of economy and social activities, who are proposed by the Association of Employers of the Republic and the civil sector.

Organization and the manner of operation of the Council are more closely regulated by Rules of Procedure. Financial resources for the work of the Council are provided from the Budget of the Republic.

4. Accreditation, self-evaluation, Quality assessment, Recognition, Equivalence

Accreditation, self-evaluation and quality assessment is defined by Law on Higher Education.

Procedure for evaluation of the institution or study programmes is performed by the independent commissions for evaluation.

The Montenegro Council of Higher Education is responsible to issue the certificate on accreditation, based on the report of the evaluation commissions. International experts may be included into Commissions for evaluation (prescribed by Law).

Institution is subject to reaccreditation procedure within maximum five year intervals required.

The importance of accreditation is aimed to provide quality and opening opportunity for international recognition, mobility and international exchange.

Quality assurance was envisaged as obligatory for all higher education institutions and that is a prerequisite for accreditation. The law prescribes QA to become permanent exercise to be conducted through self-evaluation, student-evaluation and external evaluation.

An institution performs self-evaluation procedure, i.e. evaluation and assessment of the quality of its courses of study and work conditions.

Self-evaluation is performed continuously, in accordance with the institution statute.

Self-evaluation methods are determined depending on curricula, teaching equipment, qualification of academic staff, teaching method, percentage of students who pass exams, percentage of graduates and other necessary indicators of the successful work of the institution.

Independent outside and inside financial control is provided by the operation of the public institution. The way in which internal financial control is performed is regulated by the statute of a public institution.

Certification and comparable procedures are defined by the Law. They are performed in close cooperation with Ministry of Education & Science and University of Montenegro.

Accreditation of engineering programs is not different from other disciplines: there are no special rules or guidelines.

Recognition

Through recognition, a foreign diploma is equalled with a diploma acquired in the Republic in view of the right to continue education and of the right to employment.

ENIC centre, as a major tool for Lisbon Strategy Implementation was established in the Ministry of Education and Science, and keeps constant contact with all the other ENIC/NARIC centres throughout Europe

Equivalence

Through equivalence a foreign diploma is equalled with an adequate diploma obtained in the Republic in view of the right to continue education in an adequate educational programme.

Authority

Recognition, i.e. equivalence of a foreign diploma, is done by the university authorized to do so by the Ministry.

5. Three cycle degree-system

Two cycle system is based on 3+2, a few 4+1. Number of ECTS points per semester is 20, per school year 60.

By Law on Higher Education (Oct 22, 2003) diploma of academic title of **Doctor of philosophy** - after completing study programme lasting up to 3 years (**Bachelor - degree**), after obtaining academic graduate studies diploma which last minimum five years (**Master degree**) and defending doctoral dissertation (system 3+2+3). For Bachelor and Master studies student needs to earn 180 and 300 ECTS credits respectively. For Ph.D program additionally 180 ECTS points.

Taught courses are obligatory part of the doctoral phase.

A doctorate can be followed and awarded at two or more universities together (joint or double degree). This may include universities from other European countries (by Law on Higher Education this is enabled)..

6. Grading Scheme

The grading scheme consists of 5 numerical grades. There are four passing grades: 5 - *izvrstan* (excellent), 4 - *vrlo dobar* (very good), 3 - *dobar* (good) and 2 - *dovoljan* (sufficient). Non-passing grade is 1 - *nedovoljan* (insufficient).

7. Access to Higher Education

Citizens of Montenegro and persons of Montenegrin nationality domiciled outside of Montenegro, as well as foreign nationals and stateless persons permanently residing in Montenegro, have the right to enrol at a course of study under equal conditions. Foreign nationals and stateless persons who are not permanently residing in Montenegro have the right to enrol at a course of study under the terms set by the Ministry, on the basis of intergovernmental agreements and treaties. The Ministry decides on the level of tuition fees. The classification and the selection

criteria for the enrolment of candidates are established by the university or by the private higher education institutions.

(Djordje Jovanovic, 25/05/2007)

5.1.19 NETHERLANDS

Until recently, the quality of higher education in the Netherlands fell under the direct responsibility of the Minister of Education. The procedures to judge the quality of higher education programmes involved an advice by the Inspection. The advice was based on a self-study report written by the institute and needed to be confirmed by a review by independent experts. The Dutch Society of Universities (VSNU) used to play an important part in these procedures as organiser of the so called "visitations", aiming to produce the necessary documents.

In 2003 a new law on higher education and scientific research formally introduced an accreditation procedure⁴. This law places the responsibility for accreditation in higher education in the Netherlands with a newly founded Institute, the Nederlands Vlaamse Accreditatie Organisatie (NVAO, website: <http://nvaio.net/>). In close concert with the stakeholders in higher education the NVAO produced an accreditation frame work, specifying which steps need to be taken in order to secure accreditation for an educational programme.

The accreditation framework specifies six topics that are judged based on a set of pre-defined criteria:

- learning objectives
- educational programme
- personnel
- facilities
- internal quality care
- conditions for continuity

At the core of these procedures stands a report from a Visiterende en Beoordelende Instantie (VBI) [Visiting and Judging Institute]. The institutes in higher education are free to choose their VBI from among several institutes providing this service. The inspection still plays a part in these procedures as guardian of the formal requirements.

In general the implementation of the NVAO accreditation procedures has gone quite smooth. In the middle of 2007 the total number of Dutch programmes that have gone through the assessment process equals 1247. In most cases a positive advice or a positive initial advice was given. The results for the Technical sector are as follows:

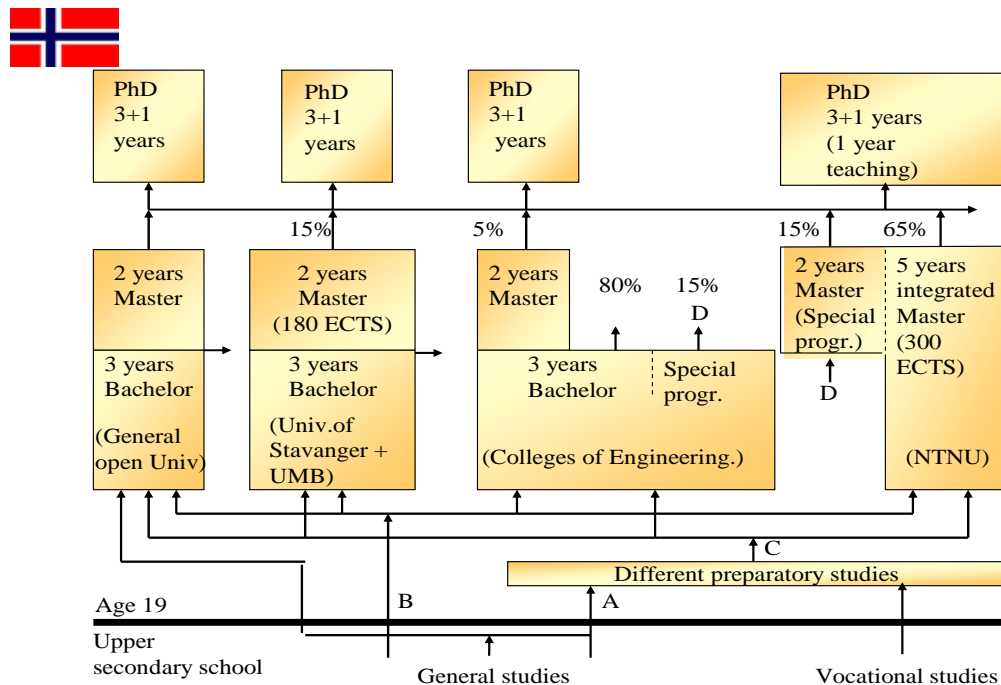
Institute	bachelor	master
Delft University of Technology	4	7
Eindhoven University of Technology	5	9
Twente University	4	7
Wageningen University		2
Universities of applied Science	149	7

(Erik de Graaff, 26/05/2007)

⁴ Beleidsregel aanwijzing instellingen voor hoger onderwijs, date: 8 July 2004, Reference: HO/BS-2004/27816 [Ruling for institutes in higher education].

5.1.20 NORWAY

1. Engineering Education Structure



The national structure of Engineering Education is given in the figure above. It indicates a 3+2+4 structure or a 5+4 structure. The %-numbers indicate in which institutions the majority of candidates are examined. The 4 years PhD consist of 1 year as assistant professor doing any kind of assistance in teaching and preparing the coursework for the PhD, before the 3 years research work.

All universities, university colleges and colleges in Norway are of the broad kind, where engineering education is organized in a faculty or department. Norway has a very special geography relative to other European countries. It has an area size approximately equal to Germany and stretched to half the length of Europe, and with only 4.5 million inhabitants. Due to this fact upper level of higher education is very centralized, and the lower level of higher education is very distributed all over the country. Norway has 5 universities, 14 university colleges and colleges that deals with engineering education. The largest university in Norway, University of Oslo (UiO), has technology programs, but gives no engineering degrees. The major university in engineering education, Norwegian University of Science and Technology (NTNU) has a special national responsibility, and educates more than 80% of the countries second tier candidates, and more than 95% of the PhDs in engineering education.

Since a new law of Higher Education from 2002, Norway changed to the Bologna recommendations.

All universities except NTNU, university colleges and colleges assign the academic degree *Bachelor of Engineering* after 180 ECTS credits (3 years), and the academic degree *Master of Science in Engineering* after 300 ECTS credits (3+2 years).

NTNU assign the academic degree *Master of Science in Engineering* after 300 ECTS credits (5 years) integrated programs to 65% of its candidates, and 120 ECTS credits (2 years) programs to

15% of its candidates. All students entering the 120 ECTS credits (2 years) program at NTNU has a Bachelor degree from somewhere else than NTNU.

NTNU is the only institution that demands an internship of 12 weeks before the candidate gets the diploma.

2. National Governance of Engineering Education

Ministry of Education has delegated the process of accrediting programs and courses to the educating institutions. Universities have full freedom to design and accredit their programs, while university colleges and colleges must design their programs within a given framework (Rammeplan), setting minimum standard for size, depth and topics for an engineering program.

The programs are designed by program councils, one for each program, with participants from professors and industry. New programs have to be approved by the faculty board and the board of the university.

Courses are designed in a process between the relevant professor or department, and the program councils for the programs who are users of that specific course.

Ministry of Education has organized a national council for engineering education (NRT), where all the educating institution in the sector, have a forum for cooperation and discussions.

NRT has defined the content of the program framework for the Bachelor programs.

NRT has initiated a process of competence description of programs and courses.

Ministry of Education has organized a national independent body (NOKUT) to survey all higher education with full authority, which means the right to withdraw accreditation rights from institutions that do not fulfill the requirements.

Institutions are evaluated on a cyclic basis with interval of a few years by committees with a broad international contribution, set up by NOKUT. The evaluation of an institution concerns whether it have a good enough quality assurance system that continuously take care of the institutions quality in programs and courses, and that the staff has adequate education.

The evaluation of an educating sector like engineering education, takes place in the same manner, but here the programs, their content, the teaching and learning processes, the quality of the students work, correctness in use of the grading scale, etc, are evaluated.

The National Research Council, on a regular basis, also with committees with a broad international contribution, evaluates research done in the institutions and put up a ranking list internal for the institutions.

3. Censor System

An external censor will on a cyclic basis, independent of the official evaluations, supervise engineering programs regularly as a part of the institutions normal quality systems.

Course level written exams are graded by the teacher, but it is voluntary to add an internal or an external censor.

Course level oral exams are always graded by two examiners, teacher and an internal or an external censor.

Master theses are always graded by the teacher and an external censor.

4. Admission to Engineering Education

All higher education in Norway is free (no tuition fees) for everyone, also foreigners, if they pass the qualification requirements. For engineering education, all applicants have to pass the highest level of mathematics with a minimum grade of average, and to pass the next highest level of

physics, in upper secondary school. In addition all applicants have to compete for a limited number of positions based on a total evaluation of their grades from upper secondary school.

5. Protection of Engineering Education

By the new law of 2002, engineering education is not longer protected by law as a professional education. But any person based on false education trying to operate in the labor market can be prosecuted.

6. Recognition of foreign education

Norway has a long tradition for buying higher education in foreign countries for their own inhabitants. The tradition has been that foreign institutions were qualified by some committees, or that candidates with foreign education asked any national educating institutions to evaluate their education relative to their own quality. After the Bologna process regarding transparency these processes are terminated concerning engineering education. It is now up to employers to evaluate what candidates they want to hire, based on the candidates actual education and institutions from which they are educated.

(Kjell Malvig, 17/05/2007)

21 POLAND

I. The system of primary and secondary education¹.

Until September 1999 the 8-year primary school was the first stage of education in Poland. After primary school students could apply for admission to secondary, general or vocational, schools.

Currently (Fig.1), the system of education in Poland offers: 6 years of primary education (primary school), 3 years of secondary general education (gymnasium), 3 years of secondary specialized education (lyceum), 2 years of vocational education (vocational school) and 2 years of complementary secondary general education (complementary lyceum).

The total number of years of primary and secondary education is 12 or 13. At the end of the secondary education cycle students can take the maturity examination - *egzamin dojrzałości (matura)*, i.e. standardized national secondary school achievement examination, and receive the maturity certificate - *świadectwo dojrzałości*.

II. System of higher education.

Various schools according to broad areas of disciplines provide Higher Education in Poland at university level. Engineering education is offered by the state Universities of Technology ("Politechnika") and also by the non-state schools.

The latter began to appear after 1990. A private school of higher education must receive permission to operate from the Ministry of National Education and Sport (MENiS). It acquires a legal status when registered by the Minister of National Education and Sport.

In 1998 the first state and private higher professional (vocational) education schools began to appear. These schools train students in professional specializations and prepare them for specific professions by including 15week internships and school practice in the mandatory curriculum.

Study programs can take the form of daily, evening or extramural studies and distant learning courses. Daily studies is the prevalent form.

To qualify for admission to an institution of higher education, the applicant must hold the maturity certificate *świadectwo dojrzałości*. The rules of admission to the first year of study are determined autonomously by each institution, but for the applicants holding the new maturity certificate (2005 or later) the final grades listed in the certificate are the base for the ranking procedures. Some higher educational institutions organize additional entrance tests to determine the applicants level of competence. The other applicants (with the maturity certificate older than 2005) still have to pass the entrance examinations.

III. Professional titles awarded to graduates of higher education institutions.

- the professional title of *licencjat* (a bachelor BSc) is awarded following the completion of 3 or 3.5-year higher professional education courses;
- the professional title of *inżynier* (a bachelor BEng) is awarded following the completion of 3.5 or 4-year higher professional education courses in technical areas, agriculture and economics and related areas;
- the title of *magister* (a master MSc) is awarded following the completion of uniform 5 or 6-year magister-level courses in a given field of study; equivalent titles include *magister edukacji* (in the field of Education), *magister sztuki* (in the field of Fine Arts), *magister architekt* (in the field of Architecture), *lekarz medycyny* (in the field of Medicine), *lekarz stomatolog* (in the field of Dentistry) and *lekarz weterynarii* (in the field of Veterinary Medicine).

The title of *magister* may also be obtained following the completion of 1,5 or 2 - year *magister* level courses, for which holders of the professional title of *licencjat* or *inżynier* are eligible,

To be awarded any of the above titles the student must complete all subjects and internships or a practical placement included in the curriculum, submit and defend a diploma project or thesis and

pass a diploma examination.

Upon graduation, each student receives a diploma in a specific field of study, two copies of the diploma, a diploma supplement and, upon request, a diploma and diploma supplement in a foreign languages.

Today, majority of Universities of Technology are offering the two-tier programs leading to the degree of Bachelor in Engineering (or BSc) in 3-4 years and Master degree (MSc) in 1.5-2 further years. In parallel, the uniform 5 year programs, leading directly to the Master degree are also offered. In the new act of Higher Education (passed by the Parliament in June 2005) the two-tier programs have form the system of higher education. Only in a few discipline (mostly in the area of medicine) the long-cycle (5-6 years) programs leading directly to the academic degree of Master will be allowed.

IV. Academic degrees and titles.

- the degree of *doktor* (PhD) is awarded to a person who has passed his/hr doctoral examinations and submitted and defended a doctoral dissertation (*rozprawa doktorska*). Holding the professional title of *magister* or its equivalent is a necessary condition for the doktor's degree;
- the degree of *doktor habilitowany* is awarded to a person who holds the doktor's degree, has significant scholarly or artistic achievements, has submitted a dissertation (*rozprawa habilitacyjna*) and has undergone the successive stages of review, debate and defense;
- the academic title is the title of *profesor* of a specified field of science, the title within the scope of art is the title of *profesor* of a specified field of art.

Qualifications awarded in arts and artistic disciplines are *kwalifikacje I stopnia* and *kwalifikacje II stopnia* (first and second degree qualifications) which correspond to the academic degree of *doktor* and *doktor habilitowany* respectively.

Academic degrees *doktor* and *doktor habilitowany* are awarded by organizational units of higher education institutions and by other scientific and research institutes. The title of *profesor* is conferred by the President of the Republic of Poland.

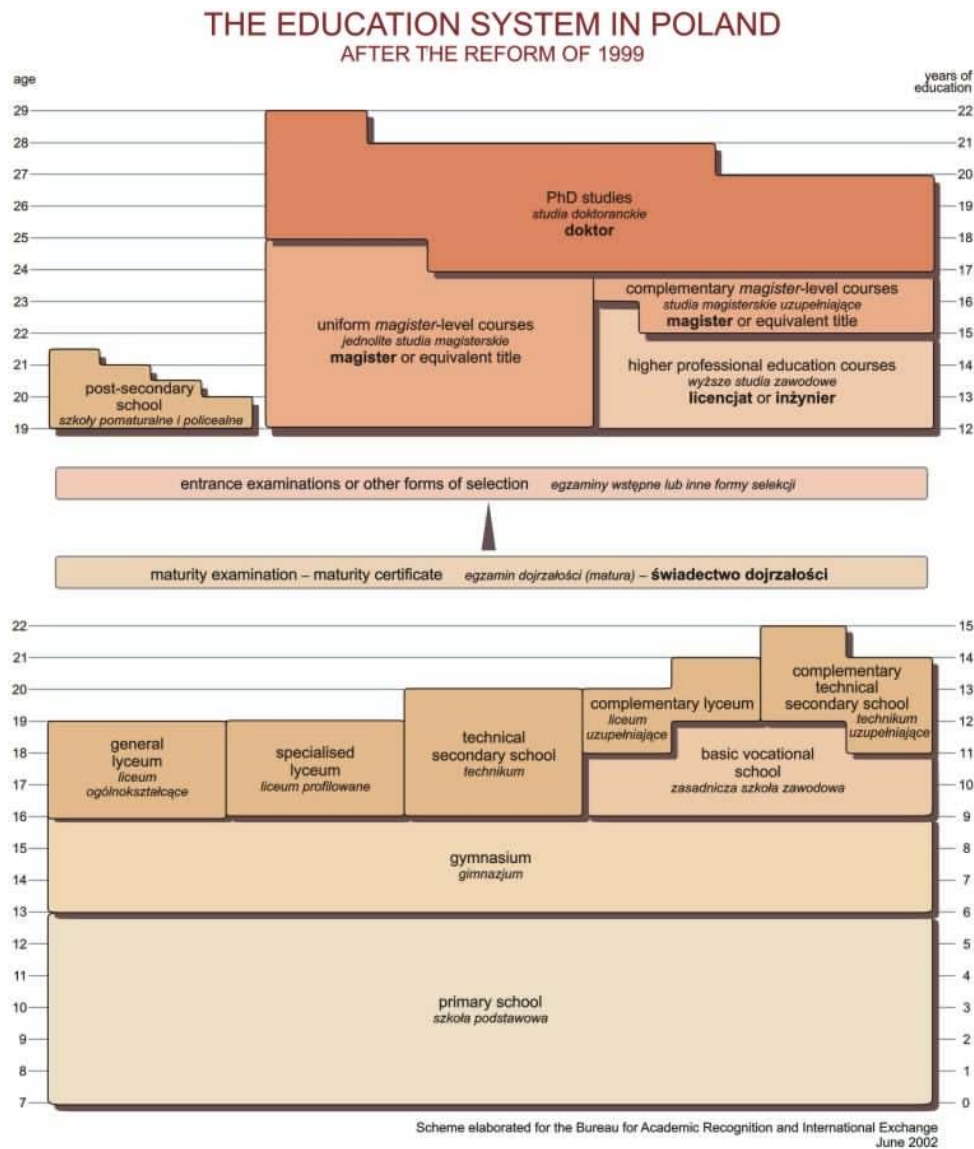


Fig. 1 The Education system in Poland
(www.buwiwm.edu.pl/educ/schemat.htm)

V. Higher Education Institutions in Poland²

Today in Poland there are 426 higher educational institutions. It comprises:

- 128 - state schools, among them 93 under the Ministry of National Education and Sports (33 vocational) and 35 under the other Ministries;
- 298 - non-public HE schools.

The total number of students is about 1.900 million

- 1.35 million (~72%) are the students of the state HE schools (54% - full time students and 46% - part time students)
- 0.550 million (~28%) are the students of the non-state HE schools (21% - full time students and 79% - part time students).

The 2004 enrollment was about 0.5 million students.

The HEI's are controlled by the Ministry of National Education and Sport and the kind of curricula (discipline) that may be offered are determined by law. The curricula itself are setup by the autonomous Universities of Technology. For the non-state HEI's it was the subject of approval by

the Central Council of Higher Education (*Rada Główna Szkolnictwa Wyższego*) and The State Accreditation Committee (*Państwowa Komisja Akredytacyjna*).

VI. Accreditation system in Poland

Evaluating quality in higher education started with the growing demand for “quality of education”. Discussion in the academic society led to establishing and launching the social accreditation activities. After a few years of discussions, numerous international contacts, the sector accreditation commissions was created. In the years 1994 – 2001 one by one accreditation commissions of various types of higher education institutions were established under the patronage of the rectors conferences of different types of high schools organized in the Rectors Conference (*KRASP*). In 2002 the *KRASP* Accreditation Commission was established with the aim to create a common ground for cooperation and representation of sector commissions.

The subject of accreditation is the organizational unit within the university i.e. faculty (or department) and the area of study. The procedure itself comprises the preparation of the self-evaluation report and site visit with several meetings. Teaching and assessment methods are the subject of investigation.

This accreditation process is voluntary and peer, and its positive outcome is a recognition of high level of particulate study program.

In parallel to this process in 1998 under the act of parliament the Accreditation Commission of Higher Vocational Education was established – the first state commission. Later was seceded by the State Accreditation Committee.

VII. The State Accreditation Committee³

The State Accreditation Committee today is the only statutory institution covering the whole of higher education that works towards the evaluation of quality of education and whose evaluations and resolutions are legally binding.

In accordance with the Act on Higher Education the Committee should consist of 50 to 70 members. For the first three years term (2002-2004) 67 was appointed out of 599 candidates proposed by the academic society. The members of the Committee work in 10 following sections (taking into consideration the number of study areas, universities, etc.): Humanities, Natural Sciences, Mathematics, Physics and Chemistry, Agriculture, Forestry and Veterinary Sciences, Medical Sciences, Physical Education, Technical Sciences, Economics, Social Studies and Law, Fine Arts.

Besides, in order to perform its statutory tasks the Committee has appointed about 400 external experts, who review applications and participate in the universities evaluation procedure (audits).

VII.1 The Statutory bodies

The statutory bodies of the State Accreditation Committee are:

- individual bodies - the President and the Secretary
- collegiate body – the Presidium.

The President and the Secretary are appointed and discharged by the minister for higher education. The Presidium is composed of the President, the Secretary and 10 section chairs. Section chairs are selected from among the section members.

The Committee Presidium plays a particularly important role, because it decides on matters connected with establishing new schools or faculties and awarding ratings to evaluated institutions.

VII.1 The basic statutory tasks of the State Accreditation Committee:

Under the Higher Education Act, the tasks of the Committee are the following;

- 1) Preparing evaluations of all applications to:
 - a) establish an institution of higher education
 - b) establish a basic or external unit of an institution,
 - c) establish new degree programs in existing institution
 - d) assign specializations in higher vocational schools to areas of study in universities and other state non-vocational schools
- 2) Evaluating the quality of education as well as carrying out control of compliance with the requirements for offering degree programs in all Polish institutions of higher education – state and non-state, academic and vocational, supervised both by the Minister of National Education and Sports as well as the Minister of Health, Minister of Culture and National Heritage and the Minister of Infrastructure.
- 3) Granting the right to establish and offer study programs different from those specified in the regulation of Minister of National Education and Sports of 28th March 2002 on the requirements that an institution of higher education should meet to establish and run a study program.

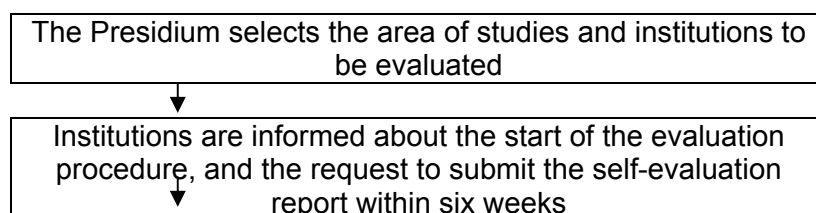
The Committee began its activity on 1st January 2002. The first year of its activity was devoted to the creation of a higher education quality evaluation system. The quality evaluation procedure started in the second half of 2002. Below one can find the overview of the progress in the evaluation of Poland's national education made by the State Accreditation Committee and of its activities in the years 2002-2004.

VII.2 Education Quality Evaluation Procedures

The most important statutory task of the Committee is the evaluation of education quality. The Presidium of the Committee selects the study programs and institutions of higher education to be evaluated in the given calendar year. The evaluation of quality of education is performed by evaluation panels composed of the members of sections and external experts. The evaluation procedure consists of a number of stages (Fig.2)

The first important stage of the evaluation procedure is preparation of the self-evaluation report by a school which will be evaluated. On the base of a template sent by a Section the institution is answering for the list of questions, gives the description of didactic process, describe the teaching facilities, the competence of academic staff etc. During the inspection the information from the report are compared with the actual state of affaires. The evaluation panel members meet the school authorities, as well as lecturers and students and audit some classes. During the panel's inspection the following issues are investigated:

- the academic staff, including both the basic staff being the precondition for the existence of a given school or a program, as well as extra staff;
- academic achievements of the staff;
- competence of the staff to teach given courses,
- curricula and study programs;
- quality of theses (including both those at the licentiate as well as master' s level);
- the scholarly activity of the inspected organizational unit;
- cooperation between schools at the national and international level;
- students' affairs;
- teaching facilities, student' s living conditions and recreation facilities,
- legal aspects of education in the inspected area of studies.



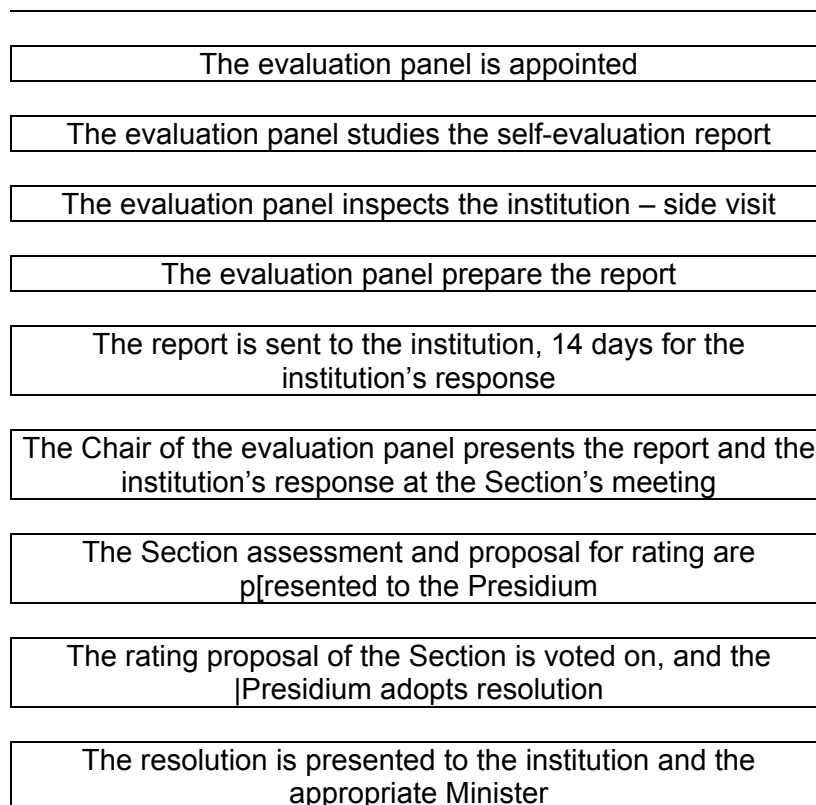


Fig.2 Stages of the education quality evaluation procedure
(www.men.waw.pl/pka)

Detailed reports prepared by evaluation panels are a valuable source of information for the evaluated institutions. After the inspected schools get acquainted with these reports, they express their own opinions, and present their stance. Subsequently the report of the evaluation panel and the institution's response are analyzed by the appropriate Section of the Committee. This comprehensive procedure enables the Section to gain insights into all conditions influencing the quality of education provided in the inspected institution and thus to propose an objective rating, which ends the evaluation procedure. The section chairperson presents the rating proposal of the Section, along with the justification, to the Committee's Presidium, which confirms the awarded rating by voting and adopts a resolution on awarding the rating to the inspected unit. The resolution is presented to the inspected unit and to the minister of higher education who, should the rating be negative, issues his or her decision on the further course of action. If the rating awarded by the Committee applies to an institution supervised by another minister, the resolution is also presented to the minister in charge of the institution.

If the evaluated organizational unit does not agree with the education quality rating awarded, it can file an application for a review of its case within 14 days of receiving the Presidium's rating decision. The application will be examined during a joint meeting of the Section and the Presidium. The application for a review is presented during the meeting by the President of the Committee or by its other member appointed by him or her. The rating agreed on during the review session is final, and it should be awarded within no longer than 60 days of the submission of the review application.

The State Accreditation Committee has adopted the four-degree scale of ratings: outstanding, positive, conditional and negative. In case of outstanding and positive rating the next evaluation is performed after 5 years. The conditional rating automatically means a "warning". The resolution includes relevant recommendations and deadlines for implementing those recommendations and possibility of conducting another on-site visit. For the institution with negative rating the minister of higher education is required to take necessary steps, such as the revoking or suspending the

license to offer a specified degree program at a specified level.

VII.3. Education Quality Evaluation Process in the years 2002-2004

During the years 2002-2004 the Committee selected 59 areas of study (in 35 the evaluation process was completed), and 867 institutions of higher education there were undergo evaluation. Among the units there were 105 state and 132 non-state schools. In 2002-2004 the Committee awarded: 20 outstanding, 724 positive, 178 conditional (89 were later replaced by the positive ratings after the second evaluation), and 38 negative ratings, amounting to 2%, 76 %, 18% and 4 % of the total.

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(Bohdan Macukow, 13/09/2005)

22 PORTUGAL

Long cycle courses in engineering education lasted for five years since 1972. The completion of these courses granted the academic degree "Licenciatura" and the professional title of "Engenheiro" was awarded by the professional association "Ordem dos Engenheiros". There were also short courses of three years leading to the academic degree of "Bacharel" and eventually to the professional title of "Engenheiro Técnico" awarded by the professional association of technical engineers (ANET – Associação Nacional de Engenheiros Técnicos). The five year courses were administered by universities. Polytechnics offered two-cycle "bacharel-licenciados" degrees, the shorter cycle more applications oriented.

Bologna process has changed the academic legislation framework in the last two years. Currently, the first cycle courses award the title of "Licenciado" and the completion of second cycle awards the title of "Mestre". Currently universities and polytechnics can offer first and second cycle courses. The professional designations corresponding to the two degrees remain for the time being unchanged. In terms of content and qualifications "Engenheiro" is essentially characterized by having an education of broader scope and "Engenheiro Técnico" is considered as possessing an education of vocational type. In some areas, where recognized research is carried out, Universities can offer integrated degrees of "Mestre", yet compulsory with an intermediate degree of "Licenciado" in engineering science after 180 ECTS. In such cases the intermediate degree is not professionally recognized and the degree of "Mestre" leads to the qualification of 'Engenheiro'.

Ordem dos Engenheiros (www.ordeng.pt) is the professional association of engineers and is currently the official body that is responsible for the professional accreditation process of the engineering long courses (level of second cycle competences). If a particular course is duly accredited by Ordem dos Engenheiros, the graduates from this course can automatically be granted the professional title of "Engenheiro". Otherwise the candidate has to pass an admission examination. Up to the end of 2006 a public institution, CNAVES (<http://168.144.195.227/cnaves1/>), was responsible for the academic recognition and evaluation of all courses in the higher education sector. Therefore, there existed two quality assurance systems, academic and professional, independent of each other. At this moment of March 2007 legislation is being prepared for the creation of a national agency for the academic accreditation of all higher education courses. Meanwhile Ordem dos Engenheiros engaged in the relevant EUR-ACE project at international level and on the creation of the Association ENAEE-European Network for Accreditation of Engineering Education, having been granted in November 2006 the right to award to EUR-ACE label in its accreditations. It is not yet defined the legal framework where the National Agency and Ordem dos Engenheiros will cooperate.

The accreditation of Ordem dos Engenheiros is granted to individual courses in the different major branches of engineering, which are offered by the higher education sector. It is valid for periods no longer than 6 years. The first step in the accreditation process is the submission of an information package describing the engineering course and its integration in the Institution; a detailed description of curricular contents including complete samples of examination handouts and final year project reports; the structure of the academic unit directly responsible for the course; the characterization of the teaching and academic staff; the portrayal of student body; description of facilities like libraries, computing centres and laboratories. Then, a committee appointed by Ordem dos Engenheiros carries out the evaluation that includes a visit to the institution. During the visit several separate meetings take place involving representatives from the academic unit in charge of the program, representatives of the teaching staff and representatives of the student body.

(Alfredo Soeiro, revised with Sebastiao Feyo, 09/03/2007)

23 ROMANIA

1. Higher engineering education in Romania at the level the academic year 2006-2007

1.1 Providers of HEE and their distribution across of the country

Higher engineering education is well developed in Romania. From the 89 accredited higher education institutions (57 public and 32 private), 38 are offering in the academic year 2006-2007 study programmes in engineering.

Among the providers of the HEE one should mention in the first place the 5 Technical Universities: University "Politehnica" and Technical University of Civil Engineering, in Bucharest, University "Politehnica" Timișoara, Technical University Iași and Technical University Cluj-Napoca. Then comes comprehensive universities with strong engineering component, such as Universities from Brașov, Craiova, Oradea, Galați, Constanța, Ploiești, Bacău, Tg. Mureș, Petroșani, Baia Mare, Pitești, Târgoviște, Reșița.

There are also 4 military academies offering engineering programmes.

In the map of Romania shown in fig. 1 are marked locations of the centres having one or several providers of HEE. As one can observe, these centres are rather well distributed across the country.

In the academic year 2006-2007, study programmes are offered in 147 specializations pertaining to 26 domains of engineering sciences (civil engineering, mechanical engineering, electrical engineering, chemical engineering, aerospace engineering, environmental engineering etc).

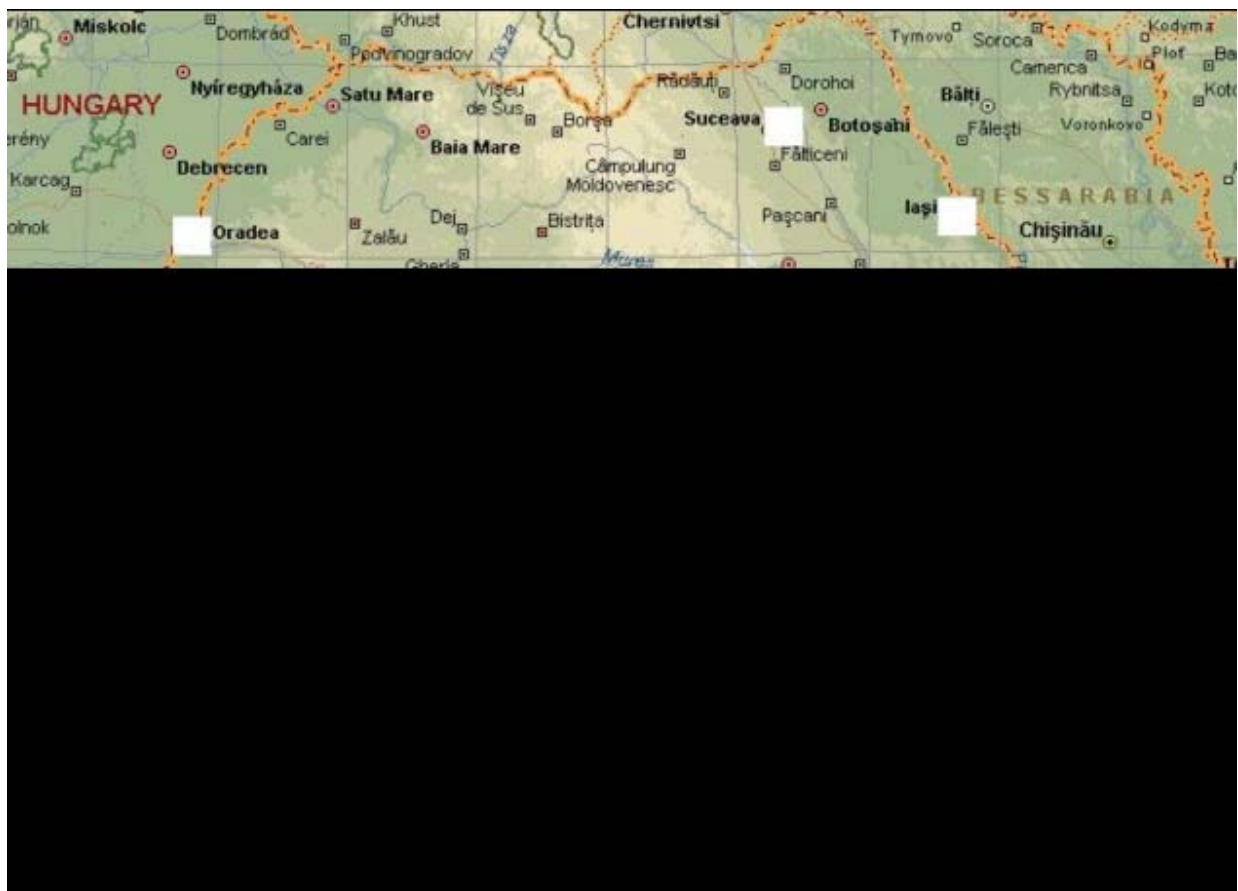


Figure 1

1.2 HEE in Romania before the implementation of the Bologna process

As a reference point is taken the academic year 2004-2005, the last one in which higher engineering education in Romania functioned following a genuine "*continental system*".

In the academic year 2004 - 2005, there were two types of undergraduate programmes.

The long duration - 5 years - programme, lead to the degree named in Romanian "*Inginer Diplomat*", considered to be equivalent to a M.Sc. degree in the anglo-saxon or two-tier system. However, this was an *integrated* programme, with no intermediary step.

The short duration - 3 years - programme, lead to the degree named in Romanian "*Inginer Colegiu*", considered to be equivalent to a B.Sc. degree in the anglo-saxon or two-tier system. Under conditions defined by the Senate of each University, a graduate of the 3-year programme could continue his/her education to become "*Inginer Diplomat*". This implied at least the equivalent of one-year courses for the "*bridge*", after which admission was granted in the 3rd year of study of the long programme.

The long duration - 5-years programmes - were intended to educate graduates with strong knowledge and understanding in mathematics, science and engineering, able to solve complex engineering problems and to use the techniques, skills and modern engineering tools necessary for engineering practice.

The curricula of the engineering programmes of long duration for a given field (profile) comprised a "common trunk" or "common track" of five to six semesters (with scientific, basic engineering and "core" engineering subjects) followed by specialized engineering subjects which make the difference between various degree courses (specializations). Non-engineering subjects (economics, humanities, foreign languages, physical education etc) were also present in the curriculum, as well as two or three periods of practical training. The long duration programmes end with a final examination, which includes the presentation and defense of the diploma project. Graduates who successfully pass the final examination receive the degree of "*Inginer Diplomat*", entitling them to go into practice without need for another professional recognition.

The short duration - 3-year programmes - were intended to educate graduates with know-how engineering technology, able to show an independent judgment within the field of activity and to implement today's knowledge in running various engineering works. The curricula of the engineering programmes of short duration were oriented toward practice. These programmes ended also with a final examination.

In the same academic year 2004 - 2005, there were two types of postgraduate programme, open only for the holders of "*Inginer Diplomat*" degree.

"*Advanced studies in engineering*" were introduced in 1994. This is a one-year postgraduate programme leading to the "*Diploma of advanced studies*". About 1/2 of the time is allocated to lectures and tutorials and 1/2 to research work and to the preparation of a Dissertation. The admission to the "*Advanced studies*" is made by examination. Candidates must be holders of the degree of "*Inginer Diplomat*", with a good academic record. Up to 20% of the graduates of the 5-year programme can be admitted to the "*Advanced studies*" programme.

The Doctorate programme in engineering is open to holders of the "*Inginer Diplomat*" degree. The "*Diploma of advanced studies*" is not a prerequisite for admission but, definitely, is an asset at the entrance colloquium and also is taken into consideration when the programme of the doctoral candidate is established.

The normal duration of doctoral studies is of 4 years for intra-mural work (full time) and 6 years for extra-mural (part time) work. There is no requirement for the attendance of courses for credits. Instead, 3-4 comprehensive examinations have to be passed and 3-4 reports have to be elaborated and presented in front of a committee. At least half of the time devoted to doctoral studies is dedicated to research and to the preparation of a Thesis which should be publicly defended. Pending the approval by vote of a Scientific Committee of 5 members (including the supervisor of the doctoral programme) the candidate is conferred a Doctor of Engineering degree, equivalent to a Ph.D degree in the anglo-saxon system.

1.3 The Bologna process in Romania and its impact on HEE

Discussions concerning the introduction of the two-tier system in engineering education in Romania started after Bologna Declaration (June 1999), at university level or at national level, taking place mainly under the auspices of the National Council of Rectors, and became particularly vivid in the autumn of 2003, when a draft of a “*Law on the organisation of university studies*” became public.

After being adopted by both Chambers of the Parliament of Romania, the Law was promulgated on 24th June 2004 and became valid on 7th July 2004, as Law 288/ 2004.

1.3.1 Main provisions of the Law 288/ 2004

University studies in Romanian are organized in three cycles

- The first cycle, with a duration of 3-4 years (180-240) ECTS Credits is called “*Licența*” (synonyme to “*Licence*” in French). *The Law stipulates that for the engineering education the first cycle is of 4 – year duration. The qualification level acquired by the graduates of the first cycle should be adequate for providing employability.*

- The second cycle, with a duration of 1-2 years (60-120 ECTS Credits), is called “*Master*”. The *cumulated duration* of the cycle I, Licence studies, and of the cycle II, Master studies, should correspond to **at least** 300 ECTS or 5 years. (The Consortium of Technical Universities in Romania agreed for a duration of **1.5 years** - 90 credits for the second cycle).

- A very important provision of the Law is found in the article stating that *for professions regulated by European norms, recommendations or good practice, universities can offer integrated programmes with a duration between 5 and 6 years, leading to diplomas equivalent to a Master degree diplomas.*

- The third cycle corresponds to *doctorate studies* having, normally, a duration of 3 years, which in justified cases (for instance experimental studies) can be extended with 1-2 additional years, pending the approval of the Senate of the university.

- The existing, short duration 3 - year programmes, are going to be dismantled, unless they can be transformed in programmes corresponding to the licence level (an option which is not going to be made in the engineering field, where only one kind of first cycle programmes, of 4-year duration, will be offered).

The provisions of the law started to be applied in the academic year 2005-2006.

1.3.2 The need for a reform in engineering education

Although the system of engineering education in Romania, at the level of 2004-2005, as described in p.1, was compatible with the Bologna spirit, there was, nevertheless, room for improvement, if one considered the positive and negative facets of various programmes. Thus, there is a reality that the 3-year programmes offered by the university colleges were very unpopular, many colleges did not succeed to fill the places offered at the entrance examinations, and even if they did, the level of the recruited students was poor. At the same time, industry did not show too much interest in the graduates of the colleges. On the other hand, the year of “*Advanced studies*”, a kind of *Advanced Master programme* (if the 5 year degree is assimilated to a Master), created mainly as a gate or step toward Doctoral studies, proved not to be so in most cases, since very few of the graduates of the programme eventually enrolled for the doctorate.

With the 3-year programmes out of the scene, a legitimate question emerged: could be, indeed, reasonable and necessary to educate **all** students through 5-year integrated programmes, with a marked design/ research character, when it is well known that only a minority will be actually employed after graduation in design/ research/ consultancy activities, while the others will work as contractors or in areas such as public administration, banking, insurance, IT etc? The need of a “*generalist*” type of engineer, educated in a shorter period of time, was quite obvious.

2. Accreditation in HEE in Romania until 2004

2.1 Evolutions which lead to a first Law on accreditation

Before the December 1989 Revolution, all higher education institutions in Romania were public institutions, under the authority of the Minister of Education. There was no need for accreditation. The situation changed suddenly in the spring of 1990 when, taking advantage of some holes in the legislation, first private university announced, with a well orchestrated advertising campaign, its apparition on the educational market. The timing was well chosen with the entrance examination approaching and the number of potential candidates exceeding several times the number of places offered by the public universities. The result was a true “explosion” of the private sector in higher education. At the same time, changes occurred in the public sector, too, with the transformation of a number of institutions providing higher education programmes of short duration in universities, with the creation of new faculties and development of new degree programmes.

To better assess the magnitude of the phenomenon, the figures in the table 1 are provided.

Table 1

Academic year	1988/1989	1993/1994
Number of public universities	44	56
Number of faculties in the public universities	101	237
Number of private universities	-	74
Number of faculties in the private universities	-	396
Number of students in the public universities	164.507	240.000
Number of students in the private universities	-	100.000

The distribution of students among various fields, for each of the two sectors, in the academic year 1993-1994, is shown in the table 2.

Table 2

Study area	Percentage of students	
	Public universities	Private universities
Engineering	37	1,5
Economics	21	38,5
Medicine	11	2
Law	4,5	38
Sciences incl. Pedagogy	24,5	19
Arts	2	1
	100	100

The academic year 1993/1994 was chosen as a reference on purpose. Indeed, due to the appearance and the expansion of the private sector, but also to the significant increase of degree programmes at the public universities, which occurred after 1990, the establishment of a legal basis for a system of accreditation and quality assurance of higher education institutions became a stringent necessity. This basis has been provided by the *Law on accreditation of higher education institutions and recognition of diploma* promulgated in 1993 and known as the Law 88/1993. Eventually, some amendments to the law were brought in 1999.

The main provision of the Law 88 was the foundation of a National Council for Academic Assessment and Accreditation (NCAAA), placed under the control of the Parliament.

NCAAA was an independent, non-governmental body, serving as a buffer organization between the public authorities and the academic communities. NCAAA established as its permanent bodies evaluation commissions for various fields of higher education, composed of experts proposed by the accredited higher education institutions. Two such commissions were created for engineering domains.

The process of academic assessment and accreditation, as defined in the Law 88, had two phases:

1. *the provisional operation license* which gave the right to organize admission of students and to conduct the educational process;

II. *the proper accreditation*, which gave, in addition, the right to organize the graduation examination and to confer diplomas recognized by the Ministry of Education and Research.

The assurance of the quality of the educational process is made by *periodic evaluation*.

When the Law 88 started to be enforced, higher education institutions in Romania were grouped into two categories:

- higher education institutions set up before 22 December 1989;
- higher education institutions set up after 22 December 1989.

Higher education institutions set up before 22 December 1989 were viewed as having proved their viability and considered to be automatically accredited. For them, the process of academic assessment and accreditation was based solely on the periodic evaluation.

On the other hand, universities, faculties or specializations (degree courses), set up after 22 December 1989, both in the public and private sector, were required by the Law 88 to demonstrate that they meet the specified requirements. As a consequence, for them the above mentioned two phases and the periodic evaluation were applicable.

For the institutions getting the accreditation, the Government, through the Ministry of Education and Research, drafted the Bill on establishing the institution and sent it to the Parliament which considered and enacted a law on establishing the higher education institution.

2.2 The functioning of the academic assessment and accreditation system between 1994 and 2004

Based on the specified criteria and standards, NCAAA undertook the phase I of the process, finalized by the granting or the refusal of *the provisional operation license* to the given institutions (for the new established institutions) or new specializations (programmes). *The provisional operation license* granted the right to organize entrance contests, to hire the teaching and auxiliary personnel and to conduct educational and research activities.

Institutions set up after 22 December 1989 were obliged to demand the provisional operation license not later than 6 months after the Law 88 was enacted.

The demand for accreditation should be made not later than 2 years since the third serie of students graduated after the institutions got the provisional operation license.

If the Reports of the NCAAA Evaluation Commissions are negative for all faculties, colleges and specializations of the institution concerned, by the decision of Government the provisional operation license is withdrawn for the institution as a whole, which thus enters in a process of liquidation beginning with the 1st year. If the Reports of the NCAAA Evaluation Commissions are negative only for some of the faculties, colleges and specializations of the concerned institution, only for them the provisional operation license is withdrawn and the liquidation process is initiated.

For accreditation purpose, the first three series of graduates of the higher education institutions which got the provisional operation license have to sustain the graduation (final) examination at the accredited faculties or colleges designated by NCAAA. To get the accreditation, besides other conditions stipulated by law is necessary that at least 51% of the total number of graduates of the first three series successfully pass the graduation (final) examination. For each of the serie, the rate of success should be at least 40%. When these conditions are not met, the faculty, college or specialization enters in the process of liquidation, starting with the 1st year.

As for the academic assessment, the faculties, colleges and specializations are subjected to a periodical academic evaluation (every five years). If the Report of the NCAAA Evaluation Commission is unfavourable, a warning is sent by the Ministry of Education and Research to the concerned institution. If after an year the Report is also unfavourable, the Ministry decides the termination of enrolment for the faculty, college or specialization, starting with the 1st year.

By 1st March 2004, the following data represent a synthesis of the intense and fruitful activity deployed by NCAAA since its foundation in 1993.

Public sector

In Romania there were 56 public universities.

The number of specializations (degree programmes or degree courses) for which the provisional operation license was demanded was 1569.

The number of specializations for which the provisional operation license was granted is 1025.

The number of demands for accreditation was 396.

NCAAA proposed the accreditation for 305 specializations.

The number of specializations for which demands for periodical evaluation were made is 512.

Following the periodical evaluation, for 369 specializations the decisions to preserve the accreditation was taken. For other 143 cases, a decision of conditional preservation of the accreditation was taken.

Private sector

A total number of 128 private institutions have prepared self-evaluation reports and sent them to NCAAA, requesting the provisional operation license for 826 specializations.

NCAAA proposed to grant the provisional operation license to 86 institutions with 364 specializations. For 19 of them, which unable to get the provisional operation license for at least one degree course, the interdiction to organize entrance examinations was issued. For other 33, as a result of the negative reports of the NCAAA Evaluation Commissions, the provisional operations license was withdrawn, and they enter in a process of liquidation.

35 institutions with 87 specializations have requested the accreditation.

For 18 institutions, bills on establishing were approved by the Parliament. In this way, beside the 56 public universities, in the academic year 2003-2004 were functioning 18 accredited private universities.

Table 3

Year	Number of degree courses authorized (the provisional operation license was granted)	Number of degree courses non-authorized (the provisional operation license was refused)	Number of degree courses which were granted the accreditation	Number of degree courses submitted to periodic evaluation
1994	5	8	-	-
1995	172	96	-	-
1996	26	6	-	-
1997	56	37	-	43
1998	32	27	33	60
1999	29	8	26	32
2000	28	3	29	7
2001	35	11	39	2
2002	25	4	14	7
2003	25	4	16	18

In the figure 2 is represented in graphical form the evaluation per year, in the same time intervals, of the following numbers:

- number of degree courses authorized
- number of degree courses which were granted accreditation
- number of degree courses submitted to periodic evaluation

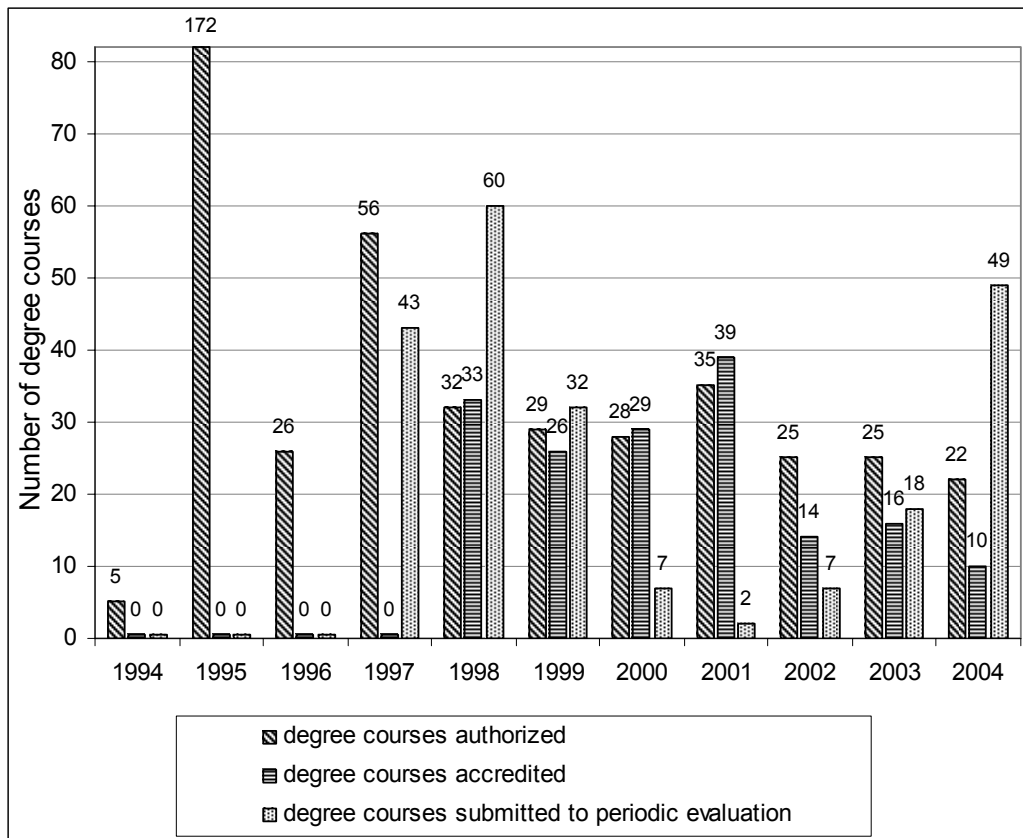


Figure 2

In the public sector, a number of 428 specializations, belonging to 28 universities, were granted the provisional operation license.

In the private sector, only 5 specializations, belonging to 5 universities were granted the provisional operation license. In fact, the 5 specializations have the same title: Applied Informatics, belonging to the field Computer Science.

One can conclude that the offer of the private sector in the domain of engineering education is quasi non-existent. This is of no surprise at all. On one hand, the engineering education had until December 1989 a prevalent role in Romania higher education system (in the academic year 1989/1990, 66% of the Romanian students were enrolled in engineering programmes). On the other hand, the costs required for an engineering education (laboratories, equipment, materials a.s.o.) are very high. No wonder then that only the field of applied informatics became interesting for the private sector, which used the infrastructure of former research and computer centres in search of privatization.

3. A new legal framework for quality assurance and accreditation introduced in 2005-2006

Recognizing the lack of a regulated mechanism for quality assurance in education, the Government of Romania adopted the decision 75/2005, dated 12.07.2005, approved by the Parliament through the Law 87/2006, dated 10.04.2006.

The Law 87/2006 refers preliminary to the quality of education, defined as *the ensemble of the characteristics of a study programme and of its provider by which are fulfilled the expectations of the beneficiaries and are met the quality standards.*

According to the same Law, accreditation is defined as *the modality of assuring the quality by which is certified the compliance of standards for the functioning of education provider institutions and of their study programmes.*

Following the provisions of the Law, in each education provider institution is constituted a Commission for the quality assessment and assurance. The main task of the Commission is to make the *internal evaluation* of the quality.

For the *external evaluation* of the quality of education, two Agencies were created, as a result of the Law 87/2006:

- ARACIS (Agenția Română de Asigurare a Calității în Învățământul Superior - Romanian Agency for Quality Assurance in Higher Education)
- ARACIP (Agenția Română de Asigurare a Calității în Învățământul Preuniversitar - Romanian Agency for Quality Assurance in Pre-university Education).

ARACIS has two Departments:

- Accreditation Department
- Quality Assurance Department.

Accreditation Department of ARACIS is replacing the former NCAAA and continues its work.

The standards and procedures to be followed by ARACIS in the field of accreditation are similar to the ones used by NCAAA.

According to the Law 87/2006, HEE institutions accredited have the right to demand the external education of quality either from ARACIS or from other agency, national or international, inscribed in the European Register of quality assurance agencies in higher education.

After the publication in 10.04.2006 of the Law 87/2006, Commissions for evaluation and assurance of quality were formed in all HEE institutions and started to check the procedures established for internal evaluation.

During the academic year 2006/2007, pilot visits of teams nominated by ARACIS are taking place in 10 universities, in order to check the compliance with compulsory requirements for the institutional assessment, as an external evaluation of education quality.

As ARACIS expert, the author participated on 16-18 May 2007 to a visit at the Technical University of Cluj-Napoca. 10 study programmes were evaluated, out of the total of 40 study programmes offered by the University.

The author was assigned with the evaluation mission for the specialization "*Civil, Industrial and Agricultural Buildings*".

The visit comprised meetings with the leadership of the University and of the Faculty, with members of the academic staff, with students and graduates, employers, examination of resources.

Although the aim was evaluation of the quality assurance and not accreditation, the format of the visit as well as the ARACIS procedures used were quite similar to the ones encountered by the author during the visits in 2005 at the Technical University Tomsk and ESTP Paris, under the auspices of the EUR-ACE project.

The Accreditation Department of the ARACIS, through its 2 commissions for engineering sciences, will be involved in the future with the periodic evaluation of study programmes previously accredited by NCAAA, and with the accreditation of new study programmes, in first place the Master programmes which will be offered by the 38 Universities, starting with the academic year 2009-2010, to the graduates at the end of 2008-2009 of the 4-year programmes implemented as a result of the Bologna process.

(Iacint Manoliu, 31/05/2007)

24 RUSSIA

Russian higher education system

Higher education is under jurisdiction of the Ministry of Education and Science of the Russian Federation, which is responsible for the accreditation and licensing of higher education institutions (HEIs) and for developing State Educational Standards. Higher Education is provided by both public and private HEIs. For the time being, there are 1422 HEIs licensed to provide educational services: 759 public (736 of them are accredited) and 663 private (410 of them are accredited). During the past decade the number of non – state HEIs has been significantly increased. The public HEIs educate about 85 % of total number of students. Only 15 % of students are taught in private HEIs and there are no private engineering schools or technical universities yet.

The transition to the multi-level educational system was initiated in 1992 when the Decree of the Committee for Higher Education of the Ministry of Science “*On Introduction of the multi-level structure for higher education in the Russian Federation*” was adopted. In accordance with the Decree, the 4-year Bachelor programmes were introduced as the First Cycle Degree (FCD) programmes. Upon completion of FCD programmes, graduates had a choice either to enter the labour market or to continue their studies to obtain the Second Cycle Degree (SCD). The SCD was awarded to the graduates who had completed the 5-year Diploma Specialist (one more year of studies after obtaining the FCD) or 2-year Master programmes. Though introduced in mid 1990s in many Russian HEIs, Bachelor programmes are still viewed as the intermediate level of specialists’ training: upon completion a Bachelor programme up to 80-90 % of students continue their studies and enter SCD, mainly Diploma Specialist, programmes. The graduates of Bachelor programmes are willingly accepted by the employers in such areas as management, economics, law and arts. In engineering holders of the ‘Bachelor Degree’ are usually neglected by the industry. The main reason is that Bachelor programmes are theoretically orientated and lack the practical training (compared with the Diploma Specialist programmes).

The amendments to the Federal Law “*On Education*” that legally establish the transition to the two-tier system of higher education, i.e. fix the 4-year Bachelor programmes and successive 2-year Master programmes and cancel the transition from Bachelor to Diploma Specialist programmes, will come into force since September 2007. However, the integrated Diploma Specialist programmes will remain in certain areas including some disciplines in engineering.

Quality assurance in higher education: state and professional accreditation

The quality assurance in higher education became crucial in mid 1990s, when HEIs were given more academic freedom and flexibility in curriculum design and number of HEIs (including private) and programmes began to increase. In order to ensure the quality of higher education, the procedure of accreditation was implemented by the Federal Law “*On Education*” of 10 July, 1992. According to the Law, the accreditation exists as state and professional.

The *state accreditation* is run by the Federal Service for Supervision and Licensing in Higher Education in the form of the integrated assessment of HEI. It aims at conducting a comprehensive analysis of HEI activities and includes: licensing, attestation, and state accreditation.

Licensing identifies that the HEI’s facilities, financial support and resources including information ones are adequate to meet the state requirements. The aim of licensing is to establish the right of HEI to provide educational services. *Attestation* is the establishment of equivalency between the

content, level, and quality of the education offered and the requirements set by the State Educational Standards. The state *accreditation* grants to the HEI the right of awarding state degrees and confirms the status of HEI (academy, institute or university). The Certificate of State Accreditation is issued for a five-year period.

While the state accreditation has an institutional basis, i.e. evaluates a HEI in general, the *professional accreditation* focuses on assessment of content and quality of a particular educational programme against the accreditation criteria, which are to be higher than the requirements of the State Educational Standard. In accordance with the Federal Law “On Education”, professional accreditation lies within responsibility of public professional organizations.

The Russian Association for Engineering Education (RAEE) is responsible for professional accreditation in engineering and technology. The Association was established in 1992. For the time being, it comprises professors, scholars, engineers, researchers, businessmen and other individuals interested in the improvement of higher engineering education. In accordance with its mission, the development of the national system for professional accreditation is one of the priorities among other activities of the Association aimed at improvement of engineering education in Russia.

The RAEE was involved in developing the national system for professional accreditation in engineering education since 1992. Until 2001 the accreditation of the programmes in engineering and technology was carried out by the Independent Accreditation Center (IAC) of which the RAEE was a founder. The IAC was the first non-governmental body evaluating programmes of higher education in Russia. In total the IAC has accredited thirty four programmes of Russian universities by 1999. In mid-1990s the Ministry of Education of the Russian Federation introduced the state accreditation of HEIs that considerably overlapped with the IAC accreditation requirements. By that time the RAEE realized the need of adoption of the output-based approach instead of the input-oriented evaluation run by the IAC.

The RAEE activities have been approved both by the Ministry of Education and Science and by professional organizations, such as Chamber of Commerce and Industry of the Russian Federation, Union of Employers and Businessmen, etc. At the national scale the RAEE principal aim is to enhance the quality of programmes in engineering and technology through their external evaluation. At the global scale the RAEE strives for international recognition of the accredited programmes and graduates qualifications.

Given priority to significance of engineering profession, role of professional community in engineering programmes evaluation and international engineering agreements, the RAEE initiated the revision of the existed system in order to make it consistent with those of the world leading engineering organizations. These changes resulted in elaboration of new set of the working documentation (the *outcomes-based* criteria and accreditation procedure, self-study manuals, expert guidelines) compatible with that existing in the Washington Accord signatories. To verify the compliance of the RAEE criteria and procedure for accreditation with the requirements existing in the world leading engineering organizations, the RAEE annually invites the representatives of the Washington Accord signatories to take part in accreditation of programmes of the Russian HEIs.

Over the past few years, the RAEE accreditation criteria and procedures have been essentially modified and improved with consideration of the valuable comments made by the international observers. Since 2003, the RAEE annually organizes the workshops for evaluators aimed at training experts to run accreditation of engineering programmes against the renewed criteria and procedure. As the result of such workshop more than 100 experts have been certified.

The integration of the Russian Federation into the European Higher Education Area influenced the development of the national system for professional accreditation. In accordance with the main objectives of the Bologna process the RAEE revised its criteria so as to clearly differentiate between the First and the Second Cycle Degree programmes. Since September 2004, the RAEE actively participates in elaboration of the common platform for the European system for accrediting engineering programmes within the framework of the EUR-ACE project and its follow-ups (EUR-ACE IMPLEMENTATION and PRO-EAST projects).

The RAEE was one of the founders of the European Network for Accreditation of Engineering Education (ENAE), organization created for launching and ensuring the effective functioning of the European accreditation system in engineering education. The RAEE is one of the six European accrediting agencies that are authorized to award the EUR-ACE Quality Label to the accredited programmes.

More information on the RAEE activities is available on the Accreditation Center website: <http://www.ac-raee.ru>.

(Oleg V. Boev, Anastasia A. Kriushova, 23/04/2007)

25 SLOVAK REPUBLIC

General rules for university studies are regulated by the Higher Education Act (effective from 2002 + amendments). The Act clearly establishes three cycle degree structure for all types of HEI, including those offering engineering studies. The Act is valid equally for public, state and private universities.

Universities can only enrol students for accredited study programmes. The first cycle of study (three years) is leading to the “Bachelor” degree (Bc.), next cycle (two years) is leading to “Magister” (Mgr.) or “Engineer” degree (Ing.). The highest degree – “Philosophie Doctor” (PhD.) is awarded after further tree years. There can be slight exceptions in duration of some study programmes.

Higher Education Act also includes relatively detailed description of accreditation. Accreditation Commission nominated by government carries out accreditation. It carries out an assessment and accreditation of all study programmes and other activities of the university as well as accreditation HEI.

Accreditation Commission

Accreditation Commission is a consultative body of the government. Higher Education Act, governmental regulation concerning Accreditation Commission, Statute of Accreditation Commission and other relevant regulations regulate its activities. 21 members appointed for 6 years by government constitute the Commission. Members are notable experts from universities (at least 2/3 of all members) and research and scientific institutions, including members from other countries. Commission can appoint working groups to prepare basic documents necessary for decision-making.

Accreditation Commission reviews and independently assesses quality of universities in education, research and development, art and other creative activities. Commission makes use primarily of self-evaluation documents provided by universities and information acquired directly at the universities during site visits, focused on the verification of these documents. According to its findings Commission issues recommendations to the Minister of Education, who is responsible to decide in all accreditation affairs.

Accreditation Commission is authorized to assess:

- Competence of university to accomplish study programme and award degrees to graduates.
- Competence of non-HEI to participate in doctoral study programme.
- Competence of university to accomplish procedures for associated professors' habilitations and professors' inaugurations.
- Applications for administrative changes in structure of universities and faculties.
- Applications for creation of private HEI.
- Application for categorisation of university into one of three groups, according to its level found out during accreditation process of HEI.
- Application for changes in the list of branches of study.
- Other applications connected with higher education, delivered by Minister of Education.

Besides the documents from universities, Accreditation Commission also acquires information from state administration bodies and other institutions.

Accreditation of study programmes

Following application of the university, Accreditation Commission assesses its competence to accomplish study programme. During this process Commission performs assessment (according to the specified standards) of study programme content, profile of graduates, recruitment of applicants of study, conditions for study completion, staff, material, technological and information background of study programme and level of students a graduates from study programme.

University has to produce the following information in its application for study programme accreditation:

- Information related to study programme, including structure and content of the courses, numbers of credits, assessment methods applied to state exams and diploma works.
- Entry requirements for students in admission process and methods of applicants' selection.
- Information of teaching staff related to study programme (number of and actually engaged teachers' posts, study programme guarantees and their characteristics, etc.).
- Information of material, technological and information background of study programme (laboratories and their equipment, libraries, study halls, accessibility of electronic information media etc.).
- Information describing study programme students and graduates, including their employability.
- Number of students or expected number of enrolled applicants.

The basic document principally used by Accreditation Commission is an evaluative report elaborated by working group. University under accreditation process expresses its opinion of that evaluative report. Evaluative report becomes a part of a statement produced by Accreditation Commission that goes to the Ministry of Education. Minister awards accreditation for study programme; its validity is normally not restricted. The conditions, which were met at the time of accreditation, have to be fulfilled during whole time when study programme is in progress. Accreditation Commission is authorized to ask for information related to accredited study programmes being in progress from the universities at any time during the period of accreditation validity. If the Commission detects the criterion necessary for awarding particular competence are no longer met by HEI, it will open a new accreditation of that competence.

Accreditation of university

Accreditation of university is a process in which Accreditation Commission comprehensive reviews and assesses pedagogical activities, research and development, art and other creative activities of the university. Commission considers university's long-term mission, as well as all conditions in which the activities are performed (staff, technological, information and other conditions). It also expresses its opinion on university's applications for accreditation of all study programmes and applications for accreditation of all procedures for associated professors' habilitations and professors' inaugurations delivered by the university. Accreditation of university takes place once in six years.

Resulting from accreditation of university there is also a suggestion for university categorisation into one of three groups, according to its status and the scope of its activities:

- **University-type HEI**; provides education in study programmes of all three cycles. Education is based on university's own activities in science, technology or art, responding to the actual state and development in these areas.
- **Research university**; university-type HEI with outstanding results in science and technology and in the third cycle study programmes.
- **Non-university-type HEI**; provides education predominantly in the first cycle study programmes.

(Michal Pokorny, 25/07/2005)

26 SLOVENIA

Higher education as well as professional and academic titles are regulated in Slovenia by two acts, the Higher education Act (No. 602-04/92-14/4), issued 7 December 1993, and the Professional and Academic Title Act (No. 602-04/91-7/12) from 12 June 1998. The first act regulates Institutions of Higher Education, which are universities, faculties, academies of art, and professional colleges (Higher Professional Schools), the second act regulates professional and academic titles awarded by higher education institutions after a completed state approved course of undergraduate or graduate studies.

The legislative background of higher education regulates the main features of the Study Programs, Duration of Studies, Academic Year and Course Load, Admission Requirements, whereas the titles are regulated by the Professional and Academic Title Act.

Two types of engineering curricula are offered in Slovenia:

Programs leading to a professional higher education degree, lasting 3,5 to 4 years, awarded with the title dipl. inz (diplomirani inženir).

Programs leading to an university degree, lasting 4,5 to 5 years, awarded with the title univ. dipl. inz (univerzitetni diplomirani inženir).

The admission requirement for undergraduate programs of the university type is a Matura examination (a final examination before 1 June 1995). After 2001/2002, a vocational Matura examination (poklicna matura) and an additional examination has been an alternative requirement also granting admission to this type of programs. Programs, as a rule, end with the diploma examination (defence of a diploma thesis). The diploma conferred after a successful completion of studies specifies the professional title naming the field of study. A university diploma enables graduates to start work or continue their studies at the post-graduate level. The admission requirement for undergraduate programs of the professional type is either a Matura, vocational Matura or final examination after the completion of a four-year secondary education programme or its equivalent. Professional higher education programs end with the defence of a diploma thesis. The diploma conferred after a successful completion of studies specifies the professional title naming the field of study. Graduates can either enter the labour market or continue their studies in programs leading to specialisation or even to Master of Science.

Transfers between professional and university type of programs are possible in both directions provided that certain conditions are met.

Professional education in engineering courses as well as university engineering courses are provided by two universities, University of Ljubljana and University of Maribor and by the free-standing higher educational institution Polytechnic Nova Gorica.

The credit transfer system (ECTS) is being gradually implemented at all engineering undergraduate levels, especially to be able to participate in the Erasmus-Socrates exchange program.

Accreditation of Engineering Study Programs

The Criteria and Procedures on Accreditation of Study Programs are applied by the Council for Higher Education of the Republic of Slovenia in performing its tasks defined by the Higher Education Act. The Council is composed of top experts in the field of higher education, science and technology, industry and social activities in such a manner that scientific, art and professional fields are represented in it.

A president and eleven members are appointed by the Government; six thereof are university professors and scientists nominated by institutions of higher education; university rectors and the president of the Slovene Academy of Science and Arts are ex officio also members.

The president and members are appointed for four years. The Council forms commissions and independent groups of experts for individual fields of its activities.

Engineering programs, prepared by the Study Commissions of corresponding Faculties and approved by their Senates and by the Senate of the University or Polytechnic are submitted in the accreditation procedure to the Commission of Natural-Technical Sciences. The commission has a chairman, who is member of the Council, and six expert members. They are preparing a report for the Council of the appropriateness of the program in regard to following criteria:

1. the appropriateness of the research foundation of the study program (basic and applied research and development) as well as human and material resources for its implementation,
2. the appropriateness of the program's formal structure,
3. the appropriateness of the program's composition with regard to its content (especially its consistency with disciplinary principles, up-to-date content and conformity of the content with the program objectives),
4. the appropriateness of the manner and form of studies,
5. the appropriateness of learning resources,
6. the appropriateness of student assessment and grading methods,
7. the appropriateness of requirements for academic progress and graduation,
8. the appropriateness of the professional, academic and scientific title, respectively,
9. the appropriateness of the program evaluation procedures (the evaluation shall be based on a comparison of the institution's study program with two or three recognised foreign programs included in the appendix),
10. the appropriateness of the program for providing the knowledge demanded by the economy and employers, respectively,
11. the employment opportunities of graduates,
12. an approximate estimation of financial resources needed for program implementation and anticipated sources.

The Council gives or denies then its approval; in addition it gives one of the following ratings on the program: highly recommended, recommended, not recommended, recommendation denied.

(Valter Dolecek , 18/06/2003)

27 SPAIN

1. HIGHER EDUCATION IN SPAIN.

Higher education in Spain is carried out at Universities, structured in Faculties, Higher Schools and University Schools. The number of Higher Education students in Spain has increased from about 170,000 students in 1960 to a million and a half in year 2000. Relatively speaking, Spain is the second European country in number of students for every 100,000 inhabitants, after Finland.

In Spain there are around 65 Universities, and about 20% of them are privately owned some by Church organisations. Universities are autonomous institutions, and higher education matters are under the regional governments' rule although there is a common framework defined by the central government.

A 1987 Decree issued in by the central government established common regulations for University Degrees valid all over the Spanish territory, and defined a new framework for Higher Education. In the old system almost all the subjects were compulsory and the study programmes were substantially equal for all the Faculties/ Schools issuing the same Degree at different Universities. Under the new regulations some flexibility in the curricula was introduced once the common core, the so called trunk subjects covering around 50 to 60 % of the credits, was guaranteed. One credit corresponds to 10 lecture hours or equivalent practical/ laboratory load.

Each University is allowed to organise the rest of the study programme and a part of it is to be defined by the student as optional. The Universities should submit their curricula to the Universities' Council for approval. Programmes of study are structured in up to three cycles, each one with a minimum number of credits. Thus, study duration is divided into short- cycle degree courses (3 years, covering a minimum of 180 credits) leading to the award of a Diploma or a Technical Engineering Degree, and long- cycle degree courses (usually 5 years with a minimum of 300 credits) leading to the award of a degree of Licenciante, Architect or Engineer. Doctorate or third-cycle studies require 36 credits over a period of 2 years before carrying out the thesis.

2. THE ENGINEERING EDUCATION SYSTEM.

It is organized as a parallel two first cycle system: Engineer (nominally 5 years) and Technical Engineer (usually lasting 3 years). Mean duration of studies up to graduation is about 40% higher the quoted values and there is a quite high drop- out rate. Entry requirements are the same for both long and short Degrees, but Technical Engineering studies have quota reserved for students coming from Professional Education different from "Bachillerato". Graduated Technical Engineers could enter at the 4th of Engineer in the same field of Engineer curricula in limited percentages granting places only to those with the best marks.

Apart from this there is a reduced number of programmes lasting only two year and leading to an Engineer Degree usually on a specialised field. Access is granted to Technical Engineers in similar fields and to students in Science and Engineering after completing three years of study. While new first cycles Degrees are still waiting for a proper regulation and the reform has not started yet, a certain number of second cycle programmes according to Bologna system have began recently.

Technical Engineer Degrees could only be issued until a few years ago by the so called Technical Engineering Schools. More recently, some of these Schools have become Higher Schools then issuing both Technical Engineering and Engineering Degrees. In Spain both types of Schools may belong to the same University as it happens in many cases (Polytechnic Universities and many others as the University of Valladolid).

By law, both Technical Engineers and Engineers have recognised professional competences and acceptance to the corresponding Technical Engineers and Engineers Councils ("Colegios") as chartered membership is automatically granted upon request after graduating.

Engineers and Technical Engineers Councils try first to maintain the status quo and, if possible, enlarge their respective fields of operation. In particular Engineering Councils do not favour the extension of a first Degree previous to the Engineer one, the same attitude which is very extended among lecturer at Higher Engineering Schools. On the other hand, Technical Engineering Councils support the extension of study programmes from 3 year which is usual now to 4 years, which is the length adopted for new first degrees in Spain.

3. QUALITY ASSESSMENT AND ACCREDITATION.

Quality assessment is an issue contemplated in the Spanish University Law (LOU) passed on 2001 and the text approved this year. Articles 31 and 32 define the general principles on the issue, although the topic is also considered in many others. As agreed at Bergen Conference in 2005, the main responsibility for quality provision and its evaluation remains with the HEIs themselves. Institutions and agencies should determine the specific procedures to be adopted in their own particular context.

A National Agency for Quality Assessment and Accreditation (ANECA) was created in 2002, while another 11 Regional Agencies have been established so far in different Autonomous Communities, since Higher Education is responsibility of Regional Governments. Both ANECA and the Catalanian Agency (AQU- Catalunya) are full members of ENQA and have applied to it for external evaluation. Another agency, the Axencia para Calidade do Sistema Universitario de Galicia (ACSUG) has applied for membership.

The QA system in Higher education is organized on a de-centralised basis, and only the ANECA, the national agency, may act over all the country. A network among all the agencies has been created for methodological and technical cooperation.

ANECA has circulated the proposal of a document on criteria and guidelines for the accreditation of First and Second Cycle Degrees valid all over Spain⁵, to be discussed with all the sectors implied as well as with the Regional Agencies.

HEIs have set up internal and external QA evaluations either on a compulsory or recommended basis. Quality assurance procedures include an internal evaluation conducted usually at the faculty/ school level, and external review by a peer- panel and the publication of a final report describing the situation, remarking strong and weak points, and pointing out measures for improvement. These reports are usually made available to the public, as well as the information on study programmes and awards

External reviews are responsibility of the agency involved and panels are set up with academics and experts from industry. Reviewers follow a procedure established by the agency and act independently, according to a code of good practice and avoiding conflicts of interest.

The level of incorporation of students in the national/ regional quality assurance bodies has been considered low in a recent review⁶. However, in internal and external reviews at University or Faculty/ School level, usually the students are integrated and have a responsible involvement. Participation of different agents in QA internal procedures is regulated. Students and stakeholders are represented in the appropriate bodies, while participation of management, academics and external experts is only recommended.

The LOU regulates the evaluation of teaching staff qualifications and if resources devoted to students learning are appropriated. Up to this moment, the main activity of ANECA has been the accreditation of teachers at different levels, since a positive assessment is required for some positions. Because of the lack of definition on procedures and cooperation among ANECA and

⁵ ANECA, Propuesta. Criterios y Directrices para la Acreditación de Enseñanzas Universitarias Conducentes a los Títulos Oficiales Españoles de Grado y Máster. 12 May (2006). Seen on 27.4.07 at http://www.aneca.es/modal_eval/docs/pa_modelo_061213.pdf.

⁶ EURYDICE, Focus on the Structure of Higher Education in Europe 2006/ 07. National Trends in the Bologna Process. European Commission, Mar 2007. Seen on 27.4.07 at http://www.bologna-bergen2005.no/Docs/02Eurydice/0504_Eurydice_National_trends.pdf.

regional agencies many teachers apply first for accreditation at their next agency and later to ANECA. In regions where there is an official language different from Spanish, some teachers want to be assessed also on that particular knowledge and they apply to the appropriate agency.

(Urbano Dominguez, 23/05/2007)

28 SWEDEN

The title of Engineer (*civilingenjör* for the five years education and *högskoleingenjör* for the shorter, three years one) is not legally protected in Sweden and has no legal status. There can therefore of course be no *de jure* recognition of non-Swedish degrees. There is a *de facto* recognition in the sense that many companies, universities and other public authorities quite extensively hire engineers carrying degrees from foreign universities.

A certain government authority, the National Agency for Higher Education, *Högskoleverket* (HSV) among other things supervises the universities. It has the authority to grant universities and colleges the right to confer certain degrees. Five comprehensive universities (Lund, Linköping, Uppsala and Umeå) and the three specialised institutions (The Royal Institute of Technology in Stockholm, Chalmers University of Technology in Göteborg and Luleå University of Technology) have thus had the right to confer the degree of *civilingenjör* for many years. To this list the HSV recently added the University of Karlstad, The Mälardalen University College, Blekinge Institute of Technology and the Mid Sweden University (Sundsvall). It also has granted a longer list of institutions of higher learning the right to confer the title of *högskoleingenjör*. This list not only includes those listed above but also a number of smaller institutions, usually in English called "University Colleges".

In the new legal framework, inspired by Bologna, the *civilingenjör* degree is defined as a professional degree on the Master level and the *högskoleingenjör* as a professional degree on *kandidat* (Bachelor) level. In parallel to these professional degrees there also exist "general" degrees in engineering/technology on both levels. The "general degree" Master is primarily granted at institutions not having the right to confer the *civilingenjör* degree.

As a consequence of the Bologna process most engineering schools have introduced the possibility to obtain a *kandidat* (Bachelor) level degree after the first three years of the *civilingenjör* programme. This degree should not be confused with the three year *högskoleingenjör* degree, even if both are translated in English as Bachelor's degrees.

HSV has not only the authority to grant certain examination rights but also to withdraw them. It may thus as the result of a quality audit decide that a certain university should lose its right to confer the degree *civilingenjör* or *högskoleingenjör*. The main role of the HSV in this context has however in the past been to decide whether or not it should satisfy demands for extended examinations rights coming mainly from the university colleges and the new universities. In January 2001 the government instructed the HSV to develop its activities and asked the HSV to examine all Swedish curricula over a six-year period and judge whether or not they satisfy certain minimum criteria. According to the plan all *civilingenjör* curricula were thus examined during the year 2005 and all *högskoleingenjör* curricula in 2002. The audits were performed by groups of experts and were based upon a combination of site visits and self-evaluation reports. All reports were made public.

Both the *högskoleingenjör* and the *civilingenjör* curricula will be audited next time in 2011.

The HSV claims that this system "bears all the international hallmarks of accreditation" (HSV 2001:10R). It should be noted, however, that the professional organisations are not involved in the HSV "accreditation" system and that the criteria are not developed and made public prior to the audits.

(Torbjörn Hedberg, 23/03/2007)

29 SWITZERLAND

An Office of Accreditation and Quality Assessment (OAQ : www.oaq.ch) has been set up a few years ago. It will be in charge of the procedures leading to accreditation of educational institutions. Accreditation is a political decision which has to be taken by political authorities (in the Swiss case: the C. U. S for "Conférence Universitaire Suisse" : www.cus.ch).

In principle all academic institutions and the curricula they offer will have to be accredited. Efforts are made to have procedures which are close to the best current practices. The Federal Institutes of Technology in Lausanne (EPFL : www.epfl.ch) and Zürich (ETHZ : www.ethz.ch) have a long experience in this area. The general rules which are being defined for evaluation and quality assessment will be close to the practices of these Institutes.

Since the Bachelor/Master system is being introduced in every university, accreditation processes will be really effective when the new curricula will be offered. For the moment a simplified set of rules is under discussion for the existing academic institutions.

(Dominique de Werra, 17/06/2003)

30 TURKEY

Organization, administration, responsibilities, authorities, and all basic activities with regard to education programs, research and publications, faculty staff, students and support personnel of all higher education institutions as well as the Higher Education Council (Yükseköğretim Kurulu – YÖK) and the Inter-university Board are regulated by the Higher Education Act in Turkey, except for those higher education institutions run by the military and the security forces which are regulated by separate laws. These regulations apply to both public universities and private universities established by foundations. All university degree programs are developed by individual universities and become effective upon the approval of their Senates followed by a final approval of YÖK. The equivalence of academic titles obtained outside Turkey is also granted by YÖK. All university degrees are formally recognized upon the graduation from a university program in Turkey. Currently there exists no formal, compulsory accreditation practice for university programs in Turkey.

As of 2006, out of 92 universities in Turkey, 79 have 93 engineering schools with engineering departments offering a total of 565 first cycle (4 years – undergraduate) engineering programs, issuing B.S. degrees in 51 different engineering disciplines. There are also 38 other (non-engineering) schools offering engineering programs, increasing the total number of first cycle engineering programs to 623 and the total number of engineering disciplines to 57. There are also numerous graduate programs in almost all engineering schools, issuing M.S. degrees requiring the completion of about two year long second cycle engineering programs beyond B.S., and Ph.D. degrees requiring the completion of about four year long second cycle engineering programs beyond B.S.

The title of “engineer” can be used by individuals immediately upon their graduation from a first cycle engineering program without any need for further requirements to satisfy and it is protected by law. There is no formal certification practice for engineers in Turkey, except in some specialized areas in engineering. There are 19 professional engineering societies in Turkey and membership to them is compulsory for practicing the engineering profession, except for those engineers employed by the government. The Union of Chambers of Engineering and Architects of Turkey (Türk Mühendis ve Mimarlar Odaları Birliği – TMMOB) serves as an umbrella institution for the engineering profession in Turkey formed as a federation of 23 professional societies in the fields of engineering and architecture.

Accreditation of engineering programs has started to become a major concern in the agenda of leading engineering schools in Turkey in early 1990’s, as a result of their quality assurance efforts in engineering education. Over the period of 10 years between 1994 and 2004, 41 engineering programs in four major universities in Turkey have gone through substantial equivalency evaluations conducted by Accreditation Board for Engineering and Technology, Inc. (ABET) of the U.S.A.

In the meantime, striving for a nationwide quality assurance system in engineering education, Engineering Deans Council (Mühendislik Dekanları Konseyi – MDK), a non-governmental platform founded in 2001 by the deans of engineering schools in Turkey, formed a task force on the establishment of a national accreditation system for engineering programs. As a result of 18 months’ work of this task force, it was decided to initiate an outcome based evaluation system for engineering programs and the Engineering Evaluation Board (Mühendislik Değerlendirme Kurulu - MÜDEK) was formed to conduct this evaluation process in 2002.

MÜDEK started the program evaluation activities with seven engineering programs of two universities in 2003–2004 evaluation period and has conducted 44 evaluations of a total of 34 engineering programs of seven universities in four evaluation periods since then. During this period of time, next to program evaluation activities, MÜDEK has also conducted four workshops to train a total of 72 program evaluators and 11 workshops to train a total of 267 program administrators and faculty members from about 50 different institutions. Since November 2004, MÜDEK has been

involved in the EUR-ACE project even though it was not an official partner and has become an official member of the follow-up project, namely, the “EUR-ACE Implementation Project”. MÜDEK has also been accepted as a full member of ENAEE, in its General Assembly in November 2006. MÜDEK’s approach to the evaluation of engineering programs has been widely welcomed and respected by the engineering education community in Turkey and has also set a good example for other disciplines in higher education. As a result of this, MÜDEK is expecting about 40 program evaluation applications from eight universities in the next (2007–2008) evaluation period, nearly matching its previous program evaluation activities in total, while trying to meet the requests coming from disciplines like architecture, medicine, and education to share its success story. This strong track record of MÜDEK established in a rather short time span of four years has led it to become a legal entity as an independent, non-governmental organization, the “Association for Evaluation and Accreditation of Engineering Programs” with the same acronym “MÜDEK” in January 2007.

The mission of MÜDEK is defined as to promote and enhance the quality of engineering education by the accreditation of engineering programs in various disciplines, resulting in better educated and qualified engineers equipped with current and developing technologies in order to advance the welfare of the society. The main objectives of MÜDEK are

- i) Evaluation of first and second cycle engineering programs of engineering schools.
- ii) Selection and training of program evaluators.
- iii) Providing information and training to program administrators (deans and program chairs) and academic staff on program evaluation.
- iv) Reviewing and updating program evaluation criteria and procedures.

The Accreditation Board for Engineering Programs (MAK) is the responsible body of MÜDEK for the evaluation and accreditation of engineering programs. MAK consists of eight members with the following composition: One representative of TMMOB, one representative of Turkish Society for Quality (Türk Kalite Derneği – KalDer), two representatives of industry, and four representatives of academia. The term of service of MAK members is two years and limited to three consecutive terms. A group of MAK members is renewed autonomously at the end of each term. MAK membership is a voluntary service. Current deans of engineering schools cannot serve as MAK members.

Program evaluations of MÜDEK are conducted by ad-hoc evaluation teams, each formed by a team chair who is a current or former MAK member and a sufficient number of program evaluators, at least one for each engineering program being evaluated. Program evaluators are selected among academics and practicing engineers who are well known experts in their fields and, who are dedicated to advancing engineering education. They are assigned to an evaluation team only after getting a proper training from MÜDEK. Strict measures are taken to avoid possible conflict of interest issues between evaluators and institutions during this assignment. Taking part in MÜDEK evaluation teams as a program evaluator is on voluntary basis. Current deans of engineering schools cannot serve as MÜDEK program evaluators.

MÜDEK evaluation of engineering programs intends to determine whether a given program satisfies a set of criteria or not, therefore it is not a process of ranking these programs but rather it is a process of individual accreditations. MÜDEK evaluations are voluntary for institutions administering engineering programs, so only those programs for which MÜDEK evaluation have been requested are evaluated. All information about an institution gathered by the MÜDEK evaluation team are kept at an utmost confidentiality by the team members and not used for purposes other than the MÜDEK evaluation.

The evaluation process of programs for an institution starts with the submission of a self-evaluation report to MÜDEK prepared by the institution according to a format set by MÜDEK. This report is examined by an evaluation team assigned by MÜDEK specific to the institution requesting evaluation of its programs. A 3–day on–site visit is performed by the evaluation team to the institution, for the purposes of

- i) Resolving unclear and/or unreported issues in the self-study report,
- ii) Meeting academic staff, students, university administration, support personnel, graduates of programs, representatives employing the graduates of programs, and any other pertinent constituencies of the programs, and
- iii) Visiting educational facilities like classrooms, laboratories, libraries, computational facilities, supporting departments, and facilities used by the students to socialize and to realize cultural activities.

The last team activity of this on-site visit is to inform the program administrators about the headlines of the team findings. A draft report on these findings and team's evaluation decision goes through several consistency checks and editorial modifications prior to its declaration to the institution as a final report and as a decision of MÜDEK. This decision may vary from a full 6-year accreditation to a shorter 2-year or 1-year probations or even to a not-to-accredit action.

Criteria used in MÜDEK evaluations aim to assure the quality of engineering education as well as to promote a continuous and sustainable system of improvement in engineering programs satisfying the needs of their constituencies. Institutions seeking evaluation of their engineering programs have the responsibility of demonstrating that each such program meets these criteria with the following main characteristics.

1. Students. The quality and performance of the students and graduates are important considerations in the evaluation of an engineering program. Evaluation, advising, and monitoring students, policies for the acceptance of transfer students, existence and enforcement of procedures to assure that all students meet all program requirements are the key indicators.
2. Program Educational Objectives. These are statements that describe the expected accomplishments of program graduates during the first several years following their graduation from the program. Involvement of program's various constituencies in their determination and periodic evaluation, consistency with the mission of the institution, sharing them with public by institutional documents, a curriculum and processes that prepare students for the achievement of these objectives, and a system of ongoing evaluation for demonstrating the achievement of these objectives and using the results to improve the effectiveness of the program are the key indicators.
3. Program Outcomes and Assessment. Program outcomes are statements that describe the knowledge, skills, and attitudes that students are expected to gain by the time of their graduation from the program. Abilities like applying knowledge of mathematics, science, and engineering, designing and conducting experiments, designing a realistic system, component, or process, functioning in multi-disciplinary teams, identifying, formulating, and solving engineering problems, acting professionally and ethically, communicating effectively, understanding the impact of engineering solutions in a global and societal context, engaging in life-long learning and contemporary issues, using the techniques, skills, and modern engineering tools necessary for engineering practice, and finally existence of an assessment system of ongoing evaluation for demonstrating the achievement of these outcomes and using the results to improve the effectiveness of the program are the key indicators.
4. Professional Component of the Curriculum. This component specifies four main subject areas appropriate to engineering. These are: (i) a major design experience, (ii) one year of mathematics and basic sciences, (iii) one and one-half years of engineering topics, and (iv) a general education component that complements the technical content of the curriculum, consistent with program objectives.
5. Academic Staff. The faculty is the most important component of an educational program. Sufficiency in both number and competencies to cover all curricular areas, levels of student-faculty interaction, student advising and counselling, university service activities, personal professional development, and interaction with practitioners and employers are the key indicators.
6. Facilities. Adequacy of classrooms, laboratories, and associated equipment and tools on computing and information infrastructure to accomplish program outcomes and to provide an atmosphere contributing to learning are the main points of emphasis in this criterion.

7. Institutional Support, Financial Resources, and Constructive Leadership. These are the key administrative factors to assure quality and continuity of the program, to attract and retain well-qualified faculty, and to acquire, maintain, and operate adequate facilities and equipment.
8. Program Specific Criteria. These are the criteria that need to be satisfied only by a program related to a specific engineering discipline in addition to the seven general criteria listed above. Currently MÜDEK has program specific criteria for 39 out of 51 engineering disciplines, covering more than 95% of the total number of engineering programs in Turkey, and is cooperating with MDK and TMMOB to develop program specific criteria for the remaining disciplines.

(Bulent E. Platin for MÜDEK, 13/07/2007)

31 UNITED KINGDOM

Introduction

In the UK, institutions of higher education are assessed as meeting national standards by the Quality Assurance Agency (QAA). In addition, individual engineering programmes may be accredited as meeting the academic requirements for registration as a professional engineer. Responsibility for the standards and process of such accreditation belongs to the Engineering Council UK (EC^{UK}) which licenses the professional engineering institutions (PEIs), many responsible for specific engineering disciplines (for example, the Institution of Mechanical Engineers, Institution of Chemical Engineers, Royal Aeronautical Society) to actually undertake the process.

The regulation against which engineering programmes are assessed is the UK Standard for Professional Engineering Competence (UK-SPEC). Building on previous regulations, UK-SPEC stresses the importance of outcomes rather than inputs as the basis for accreditation, an approach which lends itself to recognising both the diversity of higher education and the innovation involved in engineering.

During the accreditation process, an engineering department will be asked to provide information about its programme. This will include information on the process of teaching and learning, assessment strategies, the human and material resources involved, quality assurance arrangements and entry to the programme and how the cohort entry extremes will be supported. Most importantly, however, will be the demonstration of how certain learning outcomes have been achieved.

Learning Outcomes

UK-SPEC requires that a decision on whether to accredit a programme depends on the basis of whether it can demonstrate certain learning outcomes that the PEI has specified. Such learning outcomes are derived from the generic output standards for accredited degree programmes, which have been produced by the EC^{UK} and which encompass two different categories: *general learning outcomes*, which apply to all types of programmes, and *specific learning outcomes*, which are more discipline orientated in nature. The broad areas of these are set out as follows:

General Learning Outcomes

- Knowledge and Understanding
- Intellectual Abilities
- Practical skills
- General transferable skills

Specific Learning Outcomes

- Underpinning science and mathematics
- Engineering Analysis
- Design
- Economic, social and environmental context
- Engineering practice

The two sets of learning outcomes are expected to be inter-related with the general learning outcomes being embodied to a certain extent within the more discipline orientated specific learning outcomes.

Accreditation Visits

If a professional engineering institution assesses the programme as being likely to satisfy its requirements for accreditation, it will appoint an accreditation panel and make arrangements for a visit to assess the programme. The panel will include academic and industrial members trained in the principles of accreditation and conversant with the requirements for accreditation.

Such visits take place over 2 to 3 days and involve the panel meeting staff and students, visiting library, laboratory and studio resources and, most importantly, looking at student output (i.e. examination papers, project reports, etc) to ascertain whether the required learning outcomes are being met. Certain information is made available before the visit although it is becoming increasingly common for the PEIs to make a conscious effort to align requirements with those that a university department would normally have to meet for other reviews such as those relating to internal management and quality assurance.

Each PEI will have a relevant committee or board which will take the decision on whether or not a programme will be accredited, on the basis of the visit report from the accreditation panel. Programmes can be accredited for up to five years although it is common for PEIs to accredit for shorter periods in the case of new programmes whose output may have to be monitored. All accreditation decisions are posted on the EC^{UK} accredited course database.

Registration

An accredited engineering programme provides the exemplifying levels of understanding, knowledge and skills for professional competence which is the sole criterion for those individuals who wish to become registered with the EC^{UK} either as an Incorporated Engineer (IEng) or Chartered Engineer (CEng). The following qualifications exemplify the required knowledge and understanding:

Chartered Engineer

- A BEng (Hons) degree and an appropriate Masters degree or appropriate further learning to Masters level, or;
- An integrated MEng degree.

Incorporated Engineer:

- A Bachelors degree in Engineering or Technology, or;
- A Higher National Certificate or Diploma or a Foundation Degree, and appropriate further learning to Bachelors level.

The other key part in developing such competence is through an individual's professional development – this is how potential CEng and IEngs learn to apply their knowledge and understanding, and begin to apply professional judgement. PEIs will assess both an applicant's academic and professional development formation by Professional Review, which involves a document review of the applicant's evidence of competence as well as a formal interview with trained assessors.

(Paul Baile, 11/04/2007)