

## Telecommunications engineering and the Bologna declaration in Spain

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The realization of the European Higher Education Area (EHEA) is a common aim of 46 countries in Europe. The effort is usually named as the Bologna Process, after the Bologna Declaration of June 1999. Its main objective is providing the European Universities with the tools for promoting citizens and knowledge mobility, breaking the obstacles caused by historical diversity among the European higher education area systems. A central objective is the adoption of easily readable and comparable degrees, in a scheme based on two main cycles, undergraduate and graduate. Uniformity is favored by the establishment of a common system of credits, to encourage mobility among the European countries. European cooperation is also endorsed for quality assurance with a view to developing comparable criteria and methodologies.

Such a noble and high principles, must fight against a plethora of particular situations in the different countries. In Spain, the Bologna Process is currently going through its most controversial step: the definition of the new catalogue of degree plans inside the new Bologna-aware framework ruled by the Government. With some exceptions like in Medicine or Architecture, new graduate degrees in Spain are constrained to be 4 years long (240 ECTS), including a final degree project, and an optional time spent in external practices. Postgraduate degrees last one or two years (60 to 120 ECTS). In contrast to the previous framework, no nation-wide closed catalogues of graduate and postgraduate studies exist. Therefore, novel degrees can be designed and proposed by Spanish Universities. Then, the proposals require the approval of a central evaluating authority (ANECA, Agencia Nacional de Evaluación de la Calidad y la Acreditación), which checks the academic adequacy of the degree plan, and its feasibility according to the University resources. Also, a control mechanism has been added to penalize unsuccessful ephemeral studies. ANECA is in charge of auditing the degree academic results every 6 years, with the potential faculty of removing from the catalogue any degree in any University.

However, this general ruling of the graduate and postgraduate degree catalogue has a singular exception for a set of technical degrees, based on traditional Engineering professions in Spain. Telecommunications Engineering is one of them, together with others like Naval, Mining, Industrial, Aeronautics, and up to 8 different traditional Engineering academic qualifications. In the pre-Bologna framework, technical studies in those professions are separated into two levels: Technical Engineers (3 years), and Engineers (5 years). Technical Engineering degrees tackle a faster introduction into the job market, while Engineering degrees comprise deeper and more generalized studies. The migration of the technical studies to the Bologna framework has been designed in a peculiar manner. Each *old* Technical Engineering degree (with some exceptions) is converted into a new *regulated* graduate degree. *Regulated* degrees are peculiar as their structure is defined by a *degree template*, which also enumerates a minimum set of

student learning outcomes associated to the degree plan. Universities willing to incorporate a new technical degree “X” into its academic offer, must propose a degree plan compliant with the degree template “X”. Naturally, ANECA is responsible of validating this compliance. A similar strategy occurs with the old 5-year engineering degrees, which are now mapped to the concatenation of a *regulated* graduate degree in the particular profession, and a *regulated* postgraduate degree, which must also be compliant with a degree template.

The grounds for the existence of degree templates for the technical degrees, is the manner in which the professional habilitation is granted to engineers in Spain: the professional habilitation of an engineer in its specific field, is automatically obtained after the successful completion of the associated engineering degree. This means that, on one hand, no licensing exam is needed to obtain the professional habilitation. But on the other hand, the appropriate University degree is the only valid way to achieve it. In every profession, the professional habilitation is different for 3-year engineers and 5-year engineers. Therefore, it seemed logical to think in different degree templates for regulated graduate and postgraduate degrees.

In the Telecommunications Engineering profession, four pre-Bologna 3-year degrees existed in Spain: (i) Sistemas de Telecomunicación (RF engineering, signal processing and signal propagation), (ii) Telemática (telematics and networking), (iii) Electrónico (electronics in the telecommunications field), and (iv) Imagen y Sonido (audio and video). Each one is now mapped into a 4-year regulated degree, with its own degree template. One postgraduate degree in Telecommunications Engineering has also been defined. Currently, a small number of Spanish Universities are offering the new degrees in Telecommunications. Most of the Universities are still preparing their degree proposals, or have their proposals under evaluation by ANECA (a process which can take about half a year). This process is expected to be completed during 2009, or the first half of 2010. In academic year 2010-2011, new students can only be enrolled in the Bologna-aware degrees. Then, old and new degrees will coexist for some years, and each University will be involved in managing the required adaptation systems for students willing to move from old to new degrees. But that is another story.