



ELSEVIER

Contents lists available at ScienceDirect

Education for Chemical Engineers

journal homepage: www.elsevier.com/locate/eceiChemE
ADVANCING
CHEMICAL
ENGINEERING
WORLDWIDE

Education of chemical engineering in Spain: A global picture

1
2 **qi** Gumersindo Feijoo^{a,*}, Raquel Ibañez^b, Javier Herguido^c, Pedro Partal^d,
3 Montserrat Tobajas^e, Julia Sempere^f, María Fernanda López-Pérez^g,
4 María José Rivero-Martínez^b

5 ^a Department of Chemical Engineering, School of Engineering, Universidade de Santiago de Compostela, E-15782 Santiago de Compostela, Spain

6 ^b Department of Chemical and Biomolecular Engineering, School of Engineering, Universidad de Cantabria, E-39005 Santander, Spain

7 ^c Department of Chemical and Environmental Engineering, School of Engineering and Architecture (EINA), Universidad de Zaragoza, E-50018 Zaragoza,
8 Spain

9 ^d Department of Chemical Engineering, Universidad de Huelva, Huelva, Spain

10 ^e Department of Chemical Engineering, Faculty of Science, Universidad Autónoma de Madrid, Madrid, Spain

11 ^f IQS School of Engineering, Universitat Ramon Llull, Barcelona, Spain

12 ^g Department of Chemical Engineering, Universitat Politècnica de València, E-03801 Alcoy, Spain

ARTICLE INFO

Article history:

16 Received 30 March 2018

17 Received in revised form 16 May 2018

18 Accepted 23 May 2018

19 Available online xxx

Keywords:

22 Chemical Engineering Degrees

23 Gender profile

24 Employability

25 Internship

ABSTRACT

The general framework of the Chemical Engineering studies in Spain includes the Bachelor's Degree (4 years), Master's Degree (the most common duration is 1.5 years) and Doctorate (3–4 years). In 2008, the Conference of Directors and Deans of Chemical Engineering (CODDIQ) was constituted with the main objective of promoting and improving the quality of Chemical Engineering studies in Spain. Currently, Faculties and Schools of 29 Spanish universities are members of CODDIQ. An analysis of the most characteristic indicators provides a representative radiography of the Chemical Engineering Studies in Spain, whose most outstanding data are: (i) 7,396 undergraduate students, 1,014 Master students and 556 PhD students, (ii) according to the gender profile of undergraduates and graduates, the percentage of women is similar to that of men, while for faculty staff, the percentage of women is 43% and 46% for Associate and Assistant Professor (respectively) and 23% for the category of Full Professor category; (iii) after completing the Bachelor studies, most of them continue their training in the MSc in Chemical Engineering, (iv) the employability after obtaining the Master's degree is very high (>75%), which in the case of PhDs is close to 100%. The studies of Chemical Engineering in Spain have a very direct relationship with society, especially in the chemical, environmental, biotechnological and energy fields. The companies that collaborate in the training of future professionals are distributed throughout the national territory, which allows a strong connection with the socioeconomic environment.

© 2018 Published by Elsevier B.V. on behalf of Institution of Chemical Engineers.

1. Framework of chemical engineering studies in Spain

The implementation of the European Higher Education Area (EHEA, 2016) following the Bologna Declaration meant the transformation of the Chemical Engineering studies in Spain. At the beginning of this decade, new degrees were launched, covering the different levels of qualification: Bachelor, Master and PhD. The Bachelor in Chemical Engineering, like all other engineering degrees, has a duration of 4 years (240 ECTS – European Credit Transfer and Accumulation System; 1 ECTS implies 25 h. of work for the student). The curricula of practically all Bachelor studies follow the guidelines necessary for obtaining the professional degree in

the field of engineering, in accordance with the professional duties contained in the Order of the Ministry of Science and Innovation (Orden CIN/351/2009). In relation to the Master, the duration of the studies depends on the university and ranges between 60 and 120 ECTS, although the most common value is 1.5 years (90 ECTS). The Master study programmes follow the guidelines (competencies and recommendations) published in the Resolution of 8 June 2009, issued by the General Secretariat of Universities, in which the Agreement of the Council of Universities on official university degrees linked to the practice of the profession of Chemical Engineer is announced (BOE, 2009). The duration of doctoral studies in Spain is scheduled for 3 years (full-time), from the admission of the doctoral candidate to the program to the presentation of the doctoral thesis, but the current value in Chemical Engineering is between 3 and 4 years. The Doctorate studies end with the preparation and defence of a doctoral thesis that incorporates the

* Corresponding author.

E-mail address: gumersindo.feijoo@usc.es (G. Feijoo).

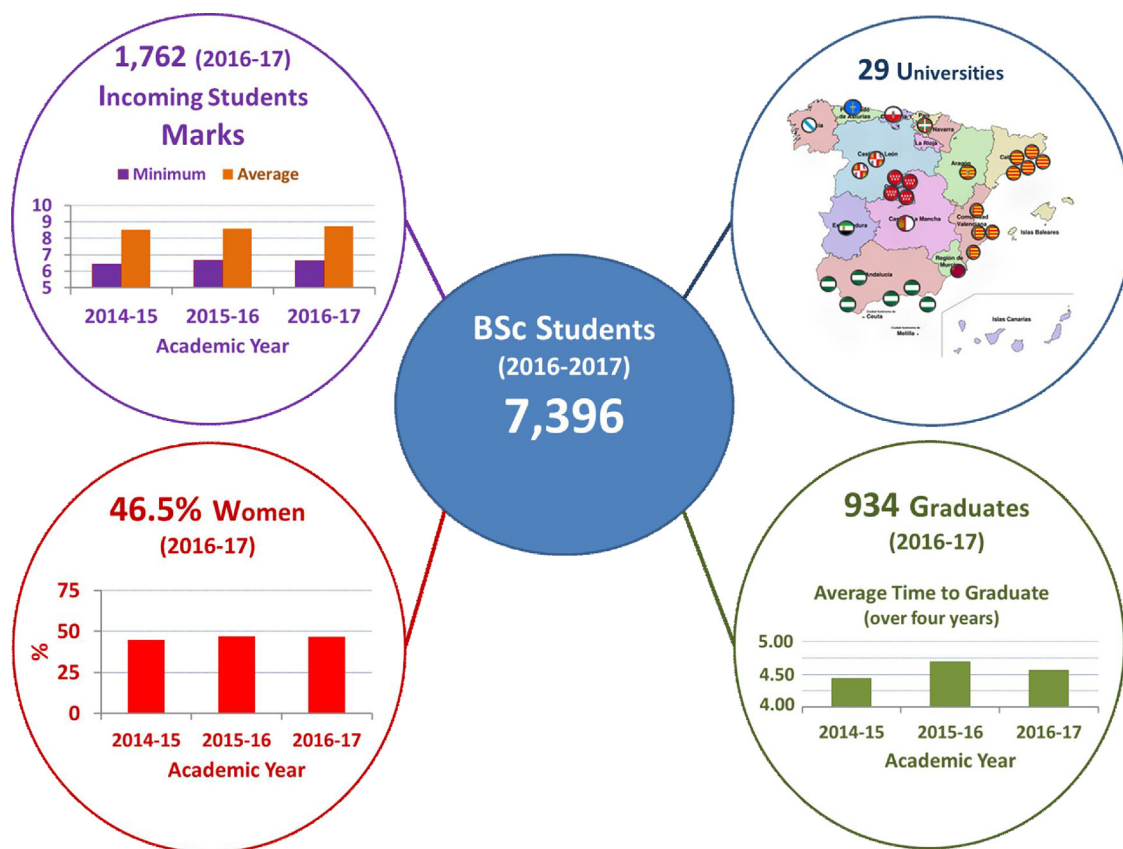


Fig. 1. Profile of students who study BSc in Chemical Engineering in Faculties and Schools members of CODDIQ. The data includes: (i) total number of students enrolled in the degree; (ii) number of students enrolled in the first academic year; (iii) distribution by gender and (iv) graduation rate.

original results of the research. The doctoral studies are organized through programs in accordance with the criteria established in Royal Decree 29/2011 (BOE, 2011).

The Conference of Directors and Deans of Chemical Engineering (CODDIQ, www.coddiqu.es) was created on 12 May 2008 with the aim of meeting a number of objectives, ranging from the promotion of the constant improvement of the quality and image of Chemical Engineering studies to the formulation of proposals related to the teaching of Chemical Engineering at different educational levels and, in particular, on general guidelines for curricula and their integration into the European framework for Higher Education. Beyond teaching activities, scientific activity in the various fields of Chemical Engineering should be promoted, in connection with other scientific and technical areas and with companies and entities, with the aim of promoting research in the university and non-university fields.

At present, Faculties and Schools from 29 Spanish universities are members of CODDIQ, involving around 85% of all Spanish universities that teach Chemical Engineering, with a representative geographical distribution (Fig. 1). CODDIQ is an open association; its members must: (i) teach at the Bachelor and/or Master level in Chemical Engineering; (ii) comply with the statutes of the association; (iii) pay an annual fee. The Professional Institutes of Chemical Engineering in Spain also belong to CODDIQ: COEQGa (Galicia, www.coeqga.es/web/index.php), COIQCV (Comunidad Valenciana, <http://www.coiqcv.com/>) and COPIQCLM (Castilla-La Mancha, <https://copiqclm.com/>). One of the CODDIQ flagships is the holding of a biannual Conference on Teaching Innovation in Chemical Engineering (<http://www.coddiqu.es/cidiqu/>), of which four editions have already been held: 2012 Granada, 2014 Valencia, 2016 Alicante and 2018 Santander. The most relevant data from the last edition were: (i) 145 participants from 28 Spanish, one Peruvian

and one British universities; (ii) 53 oral presentations; (iii) 82 poster presentations.

2. Bachelor in chemical engineering

Chemical engineers have technical knowledge of chemistry, biochemistry, engineering, materials science and information technology. However, they also know about economics, management, safety and environmental protection. The tools they have access in the laboratories include sophisticated scientific experiments, the latest developments in computing and large-scale pilot plants. Beyond the achievement of the fundamentals and methods in Chemical Engineering, the Bachelor aims to accomplish the development of transversal and non-technical skills, including ethics, responsibility and safety issues. In this context, graduates are able to design specified machines, equipment and processes, understand and apply design methods, use literature research from various sources, plan and conduct experiments on their own, communicate efficiently in oral and written form with colleagues, collaborative work in teams including international members and organize their work and time schedules, among other capabilities. One of the highlights in the Bachelor programme is the Design project, conceived as an individual or team work, in which students plan a production plant from scratch, including plant layout, environmental and safety analysis, as well as the calculation of costs and the economic viability of the project. In a few cases, however, students undertake a work based on an original research within the framework of a university laboratory or research group. The final exam is a final presentation at Faculty with analysis and discussion with the Evaluation Committee.

In the 2016-2017 academic year, 1,762 students began their studies in the Bachelor in Chemical Engineering at the 29 mem-

Download English Version:

<https://daneshyari.com/en/article/6600532>

Download Persian Version:

<https://daneshyari.com/article/6600532>

[Daneshyari.com](https://daneshyari.com)