Deepening in the approach and quality criteria of the USC Chemical Engineering programmes following IchemE guiding principles

Julia González-Álvarez*, Gumersindo Feijoo

Department of Chemical Engineering

Universidade de Santiago de Compostela

(*julia.gonzalez@usc.es)

Why IchemE accreditation?

- It provides a comparative evaluation of academic programmes against *internationally recognized high standards*.
- IChemE has accredited programmes worldwide for more than 50 years and currently *accredits more than 200 programmes*.
- It is a rigorous process that uses panels of three *experienced and trained chemical engineering professionals* from industry and academia.
- It is *modern and innovative*: concepts of sustainability, ethics, safety, health, environment, economy, ... are expected.
- The programs are evaluated based on the *learning outcomes achieved by the students*.
- It is based in a philosophy of *continuous improvement* encouraging new and innovative approaches.

The IchemE accreditation

Academic formation for Chartered Chemical Engineer

Path	Qualification		
1	M-Standard degree		
2	B-Standard degree	+	F-Standard degree
3	B-Standard degree	+	Further learning to Masters level

CHARTERED CHEMICAL ENGINEER (MIChemE)

Programme type	Years of study	IChemE credits
D-Standard	2	120
B-Standard	3	180
M-Standard	4	240
F-Standard	1.5	90

INCORPORATED CHEMICAL ENGINEER (AMIChemE)

The highest international qualification for professional chemical engineers

Learning Outcome areas

IchemE minimum credit guide

	Minimum credit							
Accreditation standard	*M-Standard*		*B-Standard*		*F-Standard*		*D-Standard*	
Underpinning Mathematics, Science and Associated Engineering [2]	Appropriate		Appropriate				Appropriate	
Core Chemical Engineering [3]	≥85	115	≥85	115			60	
Chemical Engineering Practice [3]	≥10		≥10				10	
Chemical Engineering Design Practice & Design Projects [3]	≥10		≥10				10	
Embedded learning [4]	Sufficient		Sufficient		Sufficient		Sufficient	
Advanced Chemical Engineering (Depth) [3]	*≥10*	60			*≥10*	60		
Advanced Chemical Engineering (Breadth) [3]	*≥10*				*≥10*			
Advanced Chemical Engineering (Practice) [3]	*≥10*				*≥10*			
Advanced Chemical Engineering (Design) [3]	*≥5*				*≥5*			
Total minimum specified content	**175**		**115**		**60**		**80**	
Complementary topics [5]	Balance		Balance		Balance		Balance	

Students must achieve the levels in these topics necessary to understand and achieve all of the chemical engineering outcomes

Aspects of *sustainability, safety, health and environment* and, where possible *ethics*, along with *general transferable skills* must be included

Other science/technology or non-chemical engineering subjects such as business or languages

BSc in Chemical Engineering

The degree is divided into four courses, with a total of ***240 ECTS*** (credit=ECTS, 1 ECTS per 25 h of study), composed by 222 compulsory ECTS and 18 elective ones.

Key aspects:

- Teaching in English, including the compulsory subject of Technical English (4.5 ECTS) as well as the possibility to be enrolled in 8-10 courses taught in English during the 4 years of the degree
- For the 18 optional credits, 36 credits are offered with two specializations: Chemical and Biochemical Processes and Environmental Technologies
- Professional Classroom (6.0 ECTS) aimed at developing transversal skills directly related to the labor market
- Final project (24.0 ECTS)

MSc in Chemical & Bioprocess Engineering

The curriculum consists of five modules accounting for ***90 ECTS***: Bioprocesses (12 ECTS), Holistic Design of Processes (18 ECTS), Business Management (15 ECTS), Research and Development (15 ECTS) and Industrial Internship & Master Thesis (30 ECTS). Modules 1-3 and 5 are mandatory whereas Module 4 has 12 elective ECTS.

Key aspects:

- Allows graduates to develop the profession of Chemical Engineering (BOE No. 187 of August 18, 2009)
- Multidisciplinary training (Engineering, Biology, Economics, Mathematics, Psychology) combining theoretical and practical teaching
- Compulsory internships in companies (12 ECTS)
- ERASMUS programme allows our students to choose among a large number of universities in Europe (20 agreements-30 places)
- Path to access the PhD program in Chemical and Environmental Engineering at the USC

The Bachelor in Chemical Engineering attained the B-standard qualification and the Master in Chemical and Bioprocess Engineering the F-standard qualification for the period 2018-2022


Institution of Chemical Engineers

This is to certify that

University of Santiago de Compostela

has achieved accreditation of selected programmes in fields related to chemical engineering, in accordance with IChemE's accreditation standards and procedures.

Accredited programmes and dates of validity can be found on the Engineering Council database*

Date of issue 02.02.18

John McGagh FTSE FIChemE
President

Jon Pritchard CEng FICE FInstMC
Chief Executive

Internationally ACCREDITED Degree
IChemE

IChemE ADVANCING CHEMICAL ENGINEERING WORLDWIDE

Chartered Chemical Engineer

Internationally ACCREDITED Degree
IChemE

	Positive	Negative
Internal	***Strengths*** ▪ High motivation and engagement of the academic staff ▪ Collaboration among multidisciplinary areas ▪ Outstanding student and graduate involvement ▪ Outstanding regional industry involvement ▪ USC support	***Weaknesses*** ▪ Increased workload ▪ Resistance to changes ▪ Lack of awareness on continuous quality improvement
External	***Opportunities*** ▪ Identification of areas for improvement ▪ Programmes academically sound and industrially relevant ▪ Graduates with high standard skills ▪ Professional qualification for graduates ▪ Promotion of the accreditation status of the programmes publicly ▪ Public recognition	***Threats*** ▪ Funding cuts ▪ Lack of incentives for quality improvement ▪ Difficulties in recruitment and/or promotion of the academic staff ▪ Lack of interest among students in pursuing chemical engineering programmes

SWOT analysis of IchemE accreditation

IMPROVEMENT ACTIONS

DEVELOPED OR UNDER DEVELOPMENT

OBJECTIVE

CONTINUOUS IMPROVEMENT

ACCREDITATION RENEWAL

- ❑ Creation of 2 double degrees with the University of Concepción and Pontificia Universidad Católica de Valparaíso (Chile) *(Master)* — ***Internationalization***
- ❑ ERASMUS mobility enhancement *(Master)* — ***Internationalization***
- ❑ Creation of an External Advisory Committee *(Master)* — ***Collaboration of companies***
- ❑ Participation of lecturers from companies *(Master)* — ***Collaboration of companies***
- ❑ Proposal for an activity related to technology transfer and patents *(Master)* — ***Collaboration of companies***
- ❑ Improvement of subject coordination *(Bachelor)* — ***Learning outcomes***
- ❑ Rubric for Master thesis *(Master)* — ***Learning outcomes***
- ❑ Improvement of the rubric for the degree final project *(Bachelor)* — ***Learning outcomes***
- ❑ Development of information skills *(Bachelor)* — ***Learning outcomes***
- ❑ Improvement of safety signaling in laboratories and safety information for students *(Bachelor and Master)* — ***Learning outcomes***
- ❑ Creation of informative materials (videos, posters) *(Bachelor and Master)* — ***Degree promotion***
- ❑ Renewal of the degrees's website *(Bachelor and Master)* — ***Degree promotion***
- ❑ Increase new entry woman in degrees *(Bachelor)* — ***Degree promotion***

Thank you very much
for your attention