

MOBILITY SEMESTER BACHELOR IN CHEMICAL ENGINEERING UNIVERSITY OF SANTIAGO DE COMPOSTELA

The Degree in Chemical Engineering has a long and respected reputation in the School of Engineering¹ of the University of Santiago de Compostela, one of the universities accredited by IChemE². It also has the recognition of the certificate in Occupational Health and Safety (OHSAS 18001), being the only teaching and research center that has such certification in Spain.



With the aim of encouraging the exchange of students, the degree of Chemical Engineering will implement and develop a semester of mobility for the third semester of the academic year 2021-2022 (February-June). Accordingly, a number of special courses and activities will be put into practice:

1. 8 subjects/courses that will be taught completely in English
2. A Spanish course for foreigners to accomplish one of the qualification levels defined by the Cervantes Institute³
3. Facilities at the University
4. Information about the City

¹ <https://www.usc.gal/en/center/higher-technical-engineering-school>

² <http://www.icheme.org/>

³ <http://www.cervantes.es/default.htm>



1.- COURSES OFFERED IN ENGLISH⁴:

- Chemical Process Analysis
- Organic Chemistry
- Heat Transfer
- Graphic Expression
- Environmental Engineering
- Laboratory of Fluid Transport and Heat Transfer
- Scientific Writing
- Training in research activities

Chemical Process Analysis (4.5 ECTS)

Process synthesis and analysis. Application of mass and energy balances to an integrated process. Operations with gases and vapours. Process simulation and simulators. Mechanical Energy Balance. Bernoulli's Equation. Introduction to transport phenomena. Description levels: macroscopic, microscopic and molecular. Molecular transport: Newton's, Fourier's and Fick's equations. Interphase transport: transfer coefficients and fluxes. Includes 4 lab sessions and 1 computer room session.

Organic Chemistry (6 ECTS)

Structure and nomenclature of organic compounds. Alkanes. Stereochemistry. Alkenes and Alkynes. Aromatic compounds. Haloalkanes. Alcohols and amines. Aldehydes and ketones. Carboxylic acids and derivatives. Includes 3 lab sessions and 1 computer session to represent organic molecules.

Heat Transfer (6 ECTS)

Heat transfer mechanisms and rate equations. Introduction to radiation: processes and properties. Introduction to conduction: one- and two-dimensional in steady-state conduction, transient conduction, numerical methods. Introduction to convection: convection coefficients, external flow, internal flow. Heat exchangers: overall heat transfer coefficient, analysis and design of heat exchangers, evaporators. Aspects related to safety.

Graphic Expression (6 ECTS)

Context, utility and fundamentals of Engineering Graphics. Fundamentals of orthographic, axonometric, and topographic projections. Main standard practices and symbols related to the chemical industry technical drawing. Operation of a computer-aided drawing software tool.

⁴ It is recommended that an exchange student choose between 20-30 ECTS (European Credit Transfer and Accumulation System) for one semester. One ECTS credit is equivalent to 25 hours of total workload (Bologna framework). One ECTS is equivalent to 0.5 credit courses in USA Universities.



<https://www.usc.gal/en/center/higher-technical-engineering-school>

<https://www.usc.gal/en/department/chemical-engineering>



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Environmental Engineering (4.5 ECTS)

Environmental pollution. Wastewater treatment: pre-treatment and physical treatments, biological treatments (removal of organic matter and nitrogen). Solid waste characterization and treatment. Air pollution and treatment of contaminate gases: cyclones, electrostatic precipitators, scrubbers, incineration of VOCs, Gas absorption. Environmental Management: ISO 14001, BAT & BREF, life cycle assessment, environmental footprints.

Laboratory of Fluid Transport and Heat Transfer (6 ECTS)

- *Basics of fluid transport*: Calibration of a constriction for the measurement of fluid flow; Calibration of a constriction for the measurement of gas flow; Bernoulli's theorem demonstration; Minimum discharge time from a tank
- *Fluid flow*: Fluid plant; Fluid flow through porous beds; Fluidized bed; Testing of valves for liquids
- *Pumps*: Study of centrifugal pumps; Study of a pump and its components; Bernoulli (venturi effect and diaphragm); Characteristic curves and cavitation
- *Basics of heat transfer*: Insulation; Heat conduction in non-steady state: determination of transport properties; Electrical analogy of heat conduction; Heat transfer in two phases (liquid-vapor)
- *Heat exchangers*: Double pipe; Shell and Tube; Plate



Scientific writing (1 ECTS)

Students can improve transversal competences in scientific writing. The process of scientific writing will develop specific strategies and skills for the preparation of memorandum, technical reports, project proposal and scientific papers.

Training in research activities (6 ECTS)

Students can develop research activities under the supervision of the different research groups in the School of Engineering. A wide of topics are offered, from mass transfer phenomena, separation units with ionic liquids, chemical and biochemical reactors, modelling and simulation to bioprocesses and environmental engineering, wastewater treatment, life cycle assessment and circular economy.



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2. SPANISH COURSE

The Modern Language Centre (CLM⁵) offers Courses of Spanish as a Foreign Language especially for university students (ERASMUS+, USC agreements and similar programs). The primary focus of courses at the CLM is to improve communicative skills and all courses last 100 hours (40 hours of lecture and 60 hours of supervised autonomous work). If a course is completed satisfactorily, it can be recognized with a minimum accreditation of 4 ECTS credits at the home university.

Levels Taught:

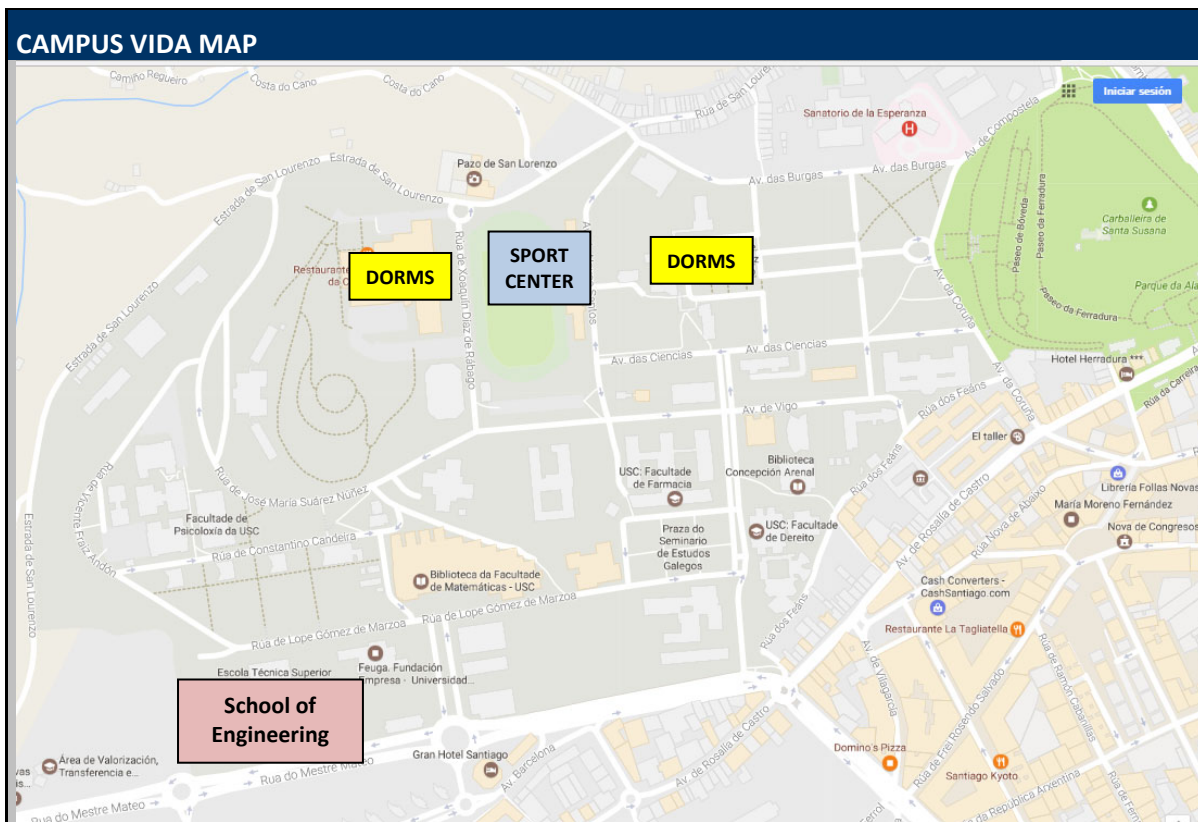
The following levels are taught at the CLM, according to the Common European Framework of Reference for Languages (CEFR): A1, A1+, A2, B1, B2 and C1.

Courses Conditions:

- Before enrollment, it is essential to take a level test that needs to be registered for previously.
- Students must attend a minimum of 80% of classes and take all final exams in order to obtain the certificate of achievement for the course.
- The course calendar follows all the general calendar (including holidays) defined by USC.
- The class groups have a maximum of 20 students and all students who attend class sessions must be enrolled.
- The acquisition of textbooks and other class materials is the responsibility of the student.

⁵ <https://www.usc.gal/en/servizos/clm/>

3. FACILITIES AT THE UNIVERSITY⁶



COLLEGE DORMS⁷

The USC has different College Dorms with affordable costs between 292 €/month (single room):
https://www.usc.gal/en/servizos/sur/convocat_mobilidade.html

Monte de Condesa



Fonseca



Since the Campus is integrated in the City of Santiago, many students choose to share a flat, with similar or lower prices

⁶ <https://www.usc.gal/en/servizos/sur/residencias/>

⁷ <https://www.usc.gal/en/servizos/sur/index.html>



UNIVERSITY CAFETERIA

The School of Engineering has a Cafeteria with self-service menu. Cost (€/ menu)⁸

6.0 €



4. THE CITY⁹

Santiago de Compostela is the capital of the autonomous community of Galicia in Northwestern Spain (Population of 95,671 inhabitants). The city has its origin in the shrine of Saint James the Great, now the city's cathedral, as destination of the Way of St. James, a leading Catholic pilgrimage route created in the 9th century. Santiago de Compostela old town is very beautiful, harmonious, safe and well preserved and hosts its five-centennial university. Santiago de Compostela is also a contemporary and competitive city. Internationally renowned architects such as Hejduk, Siza or Rossi have left their trace in Santiago. The American architect Peter Eisenman has developed his new project: the City of Culture, which is a reference of an outstanding cultural and architectonic complex.

⁸ <https://es-es.facebook.com/WWW.solpor.es/>

⁹ <http://www.santiagoturismo.com/>