

27115 - Chemical Engineering

Syllabus Information

Academic year: 2024/25

Subject: 27115 - Chemical Engineering

Faculty / School: 100 - Facultad de Ciencias

Degree: 446 - Degree in Biotechnology

ECTS: 9.0

Year: 3

Semester: Annual

Subject type: Compulsory

Module:

1. General information

The main objective of this subject is the acquisition of theoretical and practical knowledge of the discipline of Chemical Engineering by the students of the Biotechnology Degree and its relation with biotechnological processes which will be useful in their later professional practice where they will have to deal with projects in multidisciplinary environments.

The basic aspects of the subject will be the mastery of the theory and the correct solution of problems of matter and energy balances, fluid flow, basic operations in the biochemical industry, and the design and operation of chemical reactors.

To take this subject it is recommended to have passed Mathematics and Physical Chemistry.

These approaches and objectives are aligned with the Sustainable Development Goals (SDGs) of the 2030 Agenda of United Nations (<https://www.un.org/sustainabledevelopment/es/>). In particular, the acquired learning results are framed within goals 1, 2, 3, 4, 5, 6, 7, 8, 9, 12 and 13 of the SDGs.

2. Learning results

Upon completion of this subject, the student will be able to:

Explain in a reasoned way, using basic terminology, the phenomena of matter transfer and heat transfer that take place in physical and chemical processes.

Identify the main operations of a chemical plant, and specifically those of major interest in biochemical process plants, and their principle of operation.

Analyse flow diagrams (new or existing) of chemical processes from the point of view of material and energy balances.

Size and simulate basic equipment for matter and heat transfer, fluid transport and chemical reactors by means of simple graphical or analytical calculation methods.

3. Syllabus

1. Matter and energy balances. Mass and atomic balances. Steady and non-steady state. Recirculation and purge.
2. Introduction to Transport Phenomena.
Transport between phases. Application to matter transfer in fermenters.
3. Heat transfer.
4. Fluid transport.
5. Introduction to Basic Separation Operations. Types of contact. Design of equipment for contact by stages.
6. Liquid-liquid extraction.
7. Other separation operations: leaching, filtration and membrane separation.
8. Introduction to reactor design. Classification of ideal reactors. Design of ideal reactor for simple and homogeneous reactions.

4. Academic activities

The **lectures** will present the basic concepts of the subject and will be accompanied by abundant explanatory examples . (8 ECTS)

Problems and practical cases will be raised and solved (1 ECTS). Exercises to be solved at home the resolution of which will be discussed in class. The class will be participatory in nature and there will be tutorials to assist students.

5. Assessment system

The student must demonstrate that they has achieved the expected learning results through the following assessment activities:

Class participation will account for 20% of the final grade and will be the sum of the contributions made by the student in class

throughout the term. This will include class participation, the delivery of problems or the presentation of exercises in class.

Completion of a final written exam, including a theory part and a problem part, will account for 80% of the final grade . In the problems, both the correct application of the procedures and a correct result will be assessed.

In addition to the assessment system indicated in the previous paragraphs, the student will have the possibility of being evaluated in a global test, which will judge the achievement of the learning results indicated above.

The final grade of the subject will be the best between those obtained in the continuous assessment system and the one based on the global test.

6. Sustainable Development Goals

7 - Affordable and Clean Energy

9 - Industry, Innovation and Infrastructure

12 - Responsible Production and Consumption