



## Schedule of the course

Degree L/LM/LMCU	Degree in Biotechnology
Name of the course:	Industrial Biotechnology: plants
Number of credits:	6
Semester:	First semester of the third year
Teacher Professor:	Prof. Giuseppe Graziano
PhD students/fellows carrying out teaching activities in support of the course	none
Reception hours:	Wednesday 14-16
Indirizzo:	

### PRESENTATION OF THE COURSE:

The course intends to provide students with basic knowledge on some of the industrial products of particular importance to our society, such as the production of electricity and sugar, not forgetting the use of water and the need to treat it properly; and on the size of industrial equipment such as distillation columns and chemical reactors.

### LEARNING OBJECTIVES

The student should acquire knowledge about a number of industrial productions, the equipment they need to make them, the chemical and physical principles that are at the basis of their functioning and the industrial applications of some biological processes. This knowledge should enable the student of the third year to understand the content of articles about the topics discussed in critical terms and to know how to expose them clearly.

### PREREQUISITES

It is strongly recommended to have passed the exams of General and Inorganic Chemistry, Organic Chemistry, Physics with Laboratory, Physical Chemistry and Biochemistry

### COURSE ATTENDANCE

Class attendance, although not mandatory according to the University Teaching Regulations, is strongly recommended because there is no text that exactly matches the contents of the course.

## CONTENTS OF THE COURSE

Chemical and enzymatic kinetics. Chromatography. Industrial production of sugar, bioethanol, biodiesel and paper and its environmental implications. Electricity production by electromagnetic induction. Fuel cells. Semiconductors and photovoltaic effect. Water uses in industrial plants: columns with ion exchange resins, cooling towers, wastewater treatment. Cold cycle. Liquid-vapor equilibrium and distillation. Plate columns and their sizing. Azeotropic distillation. Ideal reactors: batch, CSTR, PFR. Bioreactors. Industrial fermentations. Vitamin C production. Super-stickers.

## DIDACTIC METHODS

The didactic activity is divided into frontal lessons and some numerical exercises aimed at solving important exercises for understanding the topics.

## REFERENCE TEXTBOOKS

Industrial Biochemistry – Verga and Pilone, Springer.

Class notes and material available online.

## EXAM

The exam consists of a written test of 1.5 hours with open response questions and a subsequent oral exam. The evaluation of the written test takes into account in particular the correctness of the answers and the form in which they are written in Italian language. The evaluation of the oral test takes into account the correctness of the answers to the questions, the ability to connect different parts of the program, the technical language property, and the overall expressive capacity of the student.

## EXAM CALENDAR

Refer to the link

## EXAM BOOKING

Refer to the link

## SYLLABUS

Topics	Hours	References	Lesson type
Chemical and enzymatic kinetics	6		Frontal lesson
Chromatography	2		Frontal lesson
Industrial production	8		Frontal lesson

of sugar, bioethanol and paper			
Power generation	6		Frontal lesson
Semiconductors and photovoltaic effect; cold cycle	4		Frontal lesson
Water demoralization, cooling towers, waste water treatment	6		Frontal lesson
Liquid-vapor equilibrium, distillation columns	8		Frontal lesson
Ideal chemical reactors	8		Frontal lesson
Bioreactors, vitamin C production	4		Frontal lesson
Super-stickers	2		Frontal lesson