

**COURSE DATA****DATA SUBJECT**

Code: 33196
Name: Environmental biotechnology processes engineering
Cycle: Undergraduate Studies
ECTS Credits: 4.5
Academic year: 2026-27

STUDY (S)

Degree	Center	Acad. year	Period
1111 - Grado en Biotecnología	Facultat de Ciències Biològiques	4	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1111 - Grado en Biotecnología	Optability	ELECTIVES

COORDINATION

GIMENEZ GARCIA JUAN BAUTISTA

SAN VALERO TORNERO PAU

SUMMARY

Engineering Processes in Environmental Biotechnology is a 4,5 credits optional course that is taught in the first semester of the fourth year of the Biotechnology Degree of the University of Valencia.

The main objective is that the students acquire knowledge on the application of Biotechnology in the field of Environmental Engineering. In this sense, the contents of this course provide, from a practical approach, the fundamentals required to design and operate the main biological processes used for the treatment of wastewaters, solid wastes and air emissions.

PREVIOUS KNOWLEDGE**RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE**

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS



It is suggested to pass previously the next subjects in order to affront with guaranties the matter:
Introduction to Biochemical Engineering, Bioreactors, and Basic operations on biotechnological processes.

COMPETENCES / LEARNING OUTCOMES

1102 -

Aplicar soluciones biotecnológicas a problemas medioambientales.

Conocer los diferentes tipos de procesos biotecnológicos asociados a la producción industrial.

Diseñar procesos de manipulación y obtención de productos biotecnológicos.

1111 - Grado en Biotecnología

Actuar con autonomía en el aprendizaje, tomando decisiones fundamentadas en diferentes contextos, emitiendo juicios en base a la experimentación y el análisis y transfiriendo el conocimiento a nuevas situaciones

Colaborar eficazmente en equipos de trabajo, asumiendo responsabilidades y funciones de liderazgo y contribuyendo a la mejora y desarrollo colectivo

Contribuir en el diseño, desarrollo y ejecución de soluciones que den respuesta a demandas sociales, teniendo en cuenta como referente los Objetivos de Desarrollo Sostenible

Demostrar razonamiento crítico y autocrítico en el ámbito de la titulación, considerando aspectos tales como la ética profesional, los valores morales y las implicaciones sociales de las diferentes actividades realizadas

Propose creative and innovative solutions to complex situations or problems, typical of the area of connection, to donate responses to the various professional and social needs

Saber comunicarse de manera efectiva, tanto de forma oral como escrita, adaptándose a las características de la situación y de la audiencia

DESCRIPTION OF CONTENTS

1. Biotechnological processes in environmental engineering

Introduction

Introduction to wastewater problems. Characterization parameters.
Wastewater treatment scheme. Material flow



2. Biological wastewater treatments

Introduction to wastewater problems. Characterization parameters.

Suspended-growth biological treatment: process design and operational parameters. Equipment, instrumentation and control.

Attached-growth biological treatment: process design and operational parameters. Equipment, instrumentation and control.

Sludge treatment: process design and operational parameters. Equipment, instrumentation and control.

3. Biological treatments of solid wastes

Introduction to solid wastes problems. Characterization parameters.

Composting plants for solid wastes treatment. Material flow. Mixing and aeration equipments

Anaerobic digestion plants for solid wastes treatment. Material flow. Energetic use of biogas

Anaerobic digestion plants for solid wastes treatment. Material flow. Energetic use of biogas

Technologies for energy production from solid wastes

4. Biological treatments of polluted air

Introduction to odors and organic volatile compounds problems.

Reaction schemes. Equipment, instrumentation and control.

Process design and operational parameters

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Tutorials	2,00
Theory	28,00
Laboratory	15,00
Total hours	45,00

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	12,50
Independent study and work	17,00
Preparation of lessons	15,00
Preparation for assessment activities	13,00
Resolution of case studies	10,00
Total hours	67,50

TEACHING METHODOLOGY



The methodology used in the course will consider the following aspects:

Lecture sessions: Single group to introduce the theoretical and practical principles of the course.

Practical lessons: Practical questions and problems will be solved in groups of 40 students (max) in a regular classroom. Also, resolution of problems will be proposed to the students who will individually solve.

Laboratory sessions: Students will work with wastewater treatment plants at pilot scale. Then, the students will submit a report about the work carried out at the lab. These sessions are mandatory for all the students.

Multidisciplinary and multilingual Seminar: Students will participate in a mandatory seminar in order to analyze and discuss in public a current scientific work.

Tutorials: Students will be divided into small groups and participate in mandatory sessions to solve any question they have.

EVALUATION

The evaluation of the course is based in two methods:

Method A:

1. Practice work (40% of grade), which are divided into:

- On-line question lists (10% of grade)

- Resolution of design problems (15% of grade). Students will be evaluated by the submission of several problems related to the design of any of the biological processes studied.

- Multidisciplinary and multilingual seminar (7.5% of grade). Students will be evaluated by an oral presentation. The work carried out, the ability to expose in public and the capability to discuss the subject will be evaluated.

-Laboratory (7.5% of grade). Students will be evaluated by the submission of a report about the work carried out. Students which fail the laboratory practices by the not attendance to the laboratory session, will not have another opportunity to do the laboratory practices during the same course.

2. Objective test (60% of grade): Based on a written test with theoretical and practical questions. It is mandatory to obtain in the objective test a grade equal or greater than 4.0 (out of 10).



The course will be over passed when the weighted average grade is equal to or greater than 5 (out of 10), being mandatory to obtain in the objective test a grade equal or greater than 4.5 (out of 10) and to assist to the mandatory sessions (lab and seminar). If the objective test grade is lower than 4, the final qualification will be the one obtained in the objective test.

Method B: The students that cannot follow Method A (only due to justified reasons as work, Erasmus o similar), will carry out the objective test.

REFERENCES

- Leslie Grady Jr. C.P., Daigger G.T., Lim, H.C. (1999) Biological Wastewater Treatment. Marcel Dekker, Inc. New York.
- Ferrer, J., Seco, A. (2007) Tratamientos Biológicos de de Aguas Residuales. Editorial Universidad Politécnica de Valencia.
- Metcalf & Eddy (2003) Wastewater Engineering. Treatment and Reuse, 4^a Ed., McGraw-Hill, New York.
- Tchobanoglous, G., Theisen, H., Vigil, S.A. (1996) Gestión Integral de Residuos Sólidos. McGraw-Hill Interamericana de España, Madrid.
- Z. Shareefdeen, A.S. Biotechnology for odor and air pollution control (2005) Springer, Berlin
- Castells, X.E. (2005) Tratamiento y valorización energética de residuos. Díaz de Santos, Madrid
- de Nevers, N. (1998) Ingeniería de Control de la Contaminación del Aire. McGraw-Hill Interamericana, México.