Universitat Autònoma de Barcelona

2020/2021

Biotechnological Plant Projects

Code: 100964
ECTS Credits: 6

Degree	Type	Year	Semester
2500253 Biotechnology	OT	4	0

The proposed teaching and assessment methodology that appear in the guide may be subject to changes as a result of the restrictions to face-to-face class attendance imposed by the health authorities.

Contact

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Use of Languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: Yes
Some groups entirely in Spanish: No

Prerequisites

It is necessary to choose the option of bioprocess in the bachellor.

Objectives and Contextualisation

Learning the methodology to make a design project of an industrial biotechnological plant. Planning and organization of a project. Structure and material included in a project report. To know the use of a design and plant analysis simulator applied to a bioprocess plant.

Competences

- Apply general laboratory security and operational standards and specific regulations for the manipulation of different biological systems.
- Display an integrated vision of an R&D&I process, from the discovery of the basic knowledge and the development of applications to market launch, and apply the main concepts of organisation and management to a biotechnological process.
- Identify the strategies for producing and improving products in different sectors using biotechnological methods and display an integrated vision of the R&D&I process.
- Lead and manage teams, and develop capacities for organisation and planning
- Learn new knowledge and techniques autonomously.
- Make an oral, written and visual presentation of ones work to a professional or non-professional audience in English or in one's own language.
- Read specialised texts both in English and ones own language.
- Reason in a critical manner
- Search for and manage information from various sources.
- Think in an integrated manner and approach problems from different perspectives.
- Use ICT for communication, information searching, data processing and calculations.
- Use the fundamental principles of mathematics, physics and chemistry to understand, develop and evaluate a biotechnological process.
- Work individually and in teams

Learning Outcomes

1. Apply safety rules in the design of biotechnology plants.
2. Design a biotechnology plant to obtain products by biotechnological means.
3. Design an industrial process plant for obtaining products by biotechnological means, including the different production stages.
4. Lead and manage teams, and develop capacities for organisation and planning
5. Learn new knowledge and techniques autonomously.
6. Make an oral, written and visual presentation of ones work to a professional or non-professional audience in English or in one's own language.
7. Read specialised texts both in English and ones own language.
8. Reason in a critical manner
9. Search for and manage information from various sources.
10. Think in an integrated manner and approach problems from different perspectives.
11. Use ICT for communication, information searching, data processing and calculations.
12. Use the necessary calculation tools to design biotechnology plants.
13. Work individually and in teams

Content

1. Project Management
    1. Project definition. Project Life cycle. Engineering, construction, Operation.
    2. Planning fundamentals. Objectives, product definition, market, reports, economical analysis.
    3. Project planning, Planning tools.
    4. Design variable analysis.
    5. Planning batch operation
    6. Flux diagrams. Simulation programs
    7. Process economics
    8. Optimization of bioprocesses.
    9. GMP, PAT i QbD.
    10. Project plant design.
        1. Basic information, specifications, other information.
        2. Graphic information. Process, Engineering (P&I), Layout, services.
        3. Plant services: water, air, heating and cooling, CIP, SIP.
        4. Sizing of equipments: Equipment list, Control schemes.
        5. Layout.
        6. Safety, Environmental, Operational and procedures.

Unless the requirements enforced by the health authorities demand a prioritization or reduction of these contents.

Methodology

In addition to the theoretical classes, sessions will be held in the computer classroom to learn and master the bioprocess simulator SuperproDesigner and seminars sessions where the development of the advanced project of an industrial plant of some bioprocess. All these classes and sessions are specified in the subject schedule.

The proposed teaching methodology may experience some modifications depending on the restrictions to face-to-face activities enforced by health authorities.

Activities

Title	Hours	ECTS	Learning Outcomes

Type: Directed			
Collaborative work in seminars	12	0.48	1, 9, 2, 3, 6, 7
Computer center	13	0.52	11, 10, 13, 12
Theoretical classes	27	1.08	1, 2, 8
Type: Supervised			
Preproject of bioprocess plants	95	3.8	5, 11, 1, 9, 2, 3, 6, 7, 10, 8, 13, 12

Assessment

Individual final written examination: 25% of note.

Continued evaluation of seminar sessions and progress of bioprocess plant: 40% of note.

Advocacy in public session of the bioprocess plant project: 30% of the note.

Presentation of a guide to design a team of a biotechnology plant: 5% of the note.

A student will be considered not to be evaluated (NA) if he has not performed any of the training activities.

For each assessment activity, a place, date and time of review will be indicated where the student can review the activity with the faculty. In this context, complaints can be made about the activity note, which will be evaluated by the teacher responsible for the subject. If the student does not show up for this review, this activity will not be reviewed later.

Honorary tuition (MH). The award of an honorary degree is decided by the faculty responsible for the subject. The UAB regulations state that MH may only be granted to students who have obtained a final grade equal to or greater than 9.00. Up to 5% of all enrolled students can be awarded MH.

A student shall be deemed not to be assessable (NA) if he has not submitted to any of the assessment activities.

Without prejudice to any other disciplinary measures deemed appropriate, irregularities committed by the student which may lead to a change in the rating of an assessment act shall be classified as zero. Therefore, copying, plagiarism, cheating, copying, etc. in any of the evaluation activities will mean suspending it with a zero.

Student's assessment may experience some modifications depending on the restrictions to face-to-face activities enforced by health authorities.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Final Examn	25%	2	0.08	5, 3, 7, 10, 8
Memory of the project of the design of a plant of bioprocesses	40%	0	0	5, 11, 9, 2, 3, 4, 7, 10, 13
Presentation of a design guide of an equipment of a Biotechnological plant	5%	0.5	0.02	11, 9, 6, 7, 12
Presentation of the project of the design of a plant of bioprocesses	30%	0.5	0.02	11, 1, 9, 2, 3, 6, 4, 7, 10, 8, 13, 12

Bibliography

- E. Heinzle, A. Biwer, C. Cooney "Development of Sustainable Bioprocesses". Wiley (2006).

- R. Turton et al.: "Analysis, Synthesis, and Design of Chemical Processes" 3rd ed. Prentice Hall (2009)

- Sinnott R.K. " Coulson&Richardson Chemical Engineering. Volume 6: Design". Elsevier Butterworth-Heinemann (2005).

- H.C. Vogel, C.L. Todaro. "Fermentation and Biochemical Engineering Handbook" Noyes (1997).

- B. Atkinson, F. Mavituna "Biochemical Engineering and Biotechnology

- Handbook" Macmillan (1991).