

Analysis and Synthesis of Bioprocesses

Code: 100962
ECTS Credits: 6

| Degree | Type | Year | Semester |
|-----------------------|------|------|----------|
| 2500253 Biotechnology | OB | 3 | 2 |

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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

The syllabus does not determine any specific prerequisite for this subject. However, due to its integrating nature of the different knowledge acquired throughout previous courses, the recommendation is to have passed the maximum number of subjects possible before taking it. In any case, they are essential to be able to properly follow the basic principles of bioprocess engineering, bioreactors and separation and purification processes.

Objectives and Contextualisation

Introduce to the student the concepts and practice of the integrated synthesis of bioprocesses, that is, in the selection and matching of a set of unit operations (stages of the process) for the production of a product, service at an acceptable cost and quality.

Acquire comprehension and practice in the analysis of biotechnological processes in terms of engineering, economics, compliance with regulations, quality, intellectual property, etc.

Introduce to the student the most important tools used in the analysis and to be able to use these tools in the evaluation and comparison of different solutions (proposals) of design of a determined process.

Overall, it is a subject where we intend to integrate / synthesize knowledge acquired in other subjects of the degree for the design (synthesis and analysis) of bioprocesses.

Competences

- 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.
- 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.
- Work individually and in teams

Learning Outcomes

1. Design a process for obtaining products through biotechnology.
2. Design an industrial process for obtaining products using biotechnology, from the initial discovery, through the various production stages, to market launch.
3. 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.
4. Read specialised texts both in English and ones own language.
5. Reason in a critical manner
6. Search for and manage information from various sources.
7. Think in an integrated manner and approach problems from different perspectives.
8. Work individually and in teams

Content

1. Bioprocesses

1.1. Characteristics of the biotechnological industries.

1.2. Structure of bioprocesses. The stages of the development and design of a process.

1.3. Evaluation criteria. Economy of Bioprocesses.

2. Analysis of bioprocesses.

2.1. Design of the biocatalyst.

2.2. Design of the stage of up-stream and of the system and culture strategy.

2.3. Design of the recovery stages of the product.

2.4. The quality of the process and product.

3. Synthesis of Bioprocesses (biotechnology industry).

3.1. Biotechnology applied to human and animal health.

3.2. Industrial biotechnology and agri-food.

3.3. Biocatalysis

3.4. Biotechnology applied to the environment

Methodology

In addition to the theoretical classes, the deployment will be used to carry out seminars on specific aspects (such as food and environmental biotechnology).

The subject is enrolled in the Virtual Campus and all the materials used in the classes and seminars will be deposited, as well as some articles that will allow students who are interested in deepening their knowledge in a specific subject .

Some of the classes will be done by professionals who work in the biotech industry.

Students, working in groups of 3 or 4, will have to work on a biotechnological process, of their choice, to present in writing and to be discussed in the seminar sessions.

Activities

| Title | Hours | ECTS | Learning Outcomes |
|-----------------------|-------|------|-------------------|
| Type: Directed | | | |
| Seminars | 15 | 0.6 | 6, 1, 2, 4, 7, 5 |
| Theoretical classes | 30 | 1.2 | 6, 1, 2, 4, 7, 5 |
| Type: Supervised | | | |
| Compulsory group work | 50 | 2 | 6, 3, 4, 8 |
| Type: Autonomous | | | |
| self study | 47 | 1.88 | 6, 1, 2, 4, 7, 5 |

Assessment

During the course, two partial assessments will be carried out, previously announced, which will represent 40% of the final mark as a whole. To do the average with the rest of the notes, you must obtain a minimum mark in the partial tests of 4 (out of 10).

Compulsory group work, from the seminars carried out on 4 case studies of the syllabus, will represent 15% of the final grade.

The final exam will be worth 45% of the final grade. To make an average with the rest of the notes you will need to obtain a minimum grade in this exam of 4 (out of 10).

To participate in the recovery, the students must have previously been evaluated in a set of activities whose weight equals to a minimum of two thirds of the total grade of the subject or module. Therefore, students will obtain the "Non-Valuable" qualification when the evaluation activities carried out have a weighting of less than 67% in the final grade

Students who do not pass the assessment may submit a review of the whole theoretical part, which will have a score of 85% (which must be added the compulsory seminars of 15% that is not recoverable).

Assessment Activities

| Title | Weighting | Hours | ECTS | Learning Outcomes |
|-----------------------|-----------|-------|------|-------------------|
| Compulsory group work | 15% | 0 | 0 | 6, 3, 4, 7, 8 |
| Final Exam | 45% | 3 | 0.12 | 1, 2, 7, 5 |

Bibliography

- Heinzle E., Biewer A., Cooney C. 2006. Development of Sustainable Bioprocesses: Modelling and Assessment. John Wiley & Sons, Ltd. (ref. biblioteca UAB: 66.09, CDROM:RED/674).
- Atkinson B., Mavituna F. 1991. Biochemical Engineering and Biotechnology Handbook. (ref. biblioteca UAB: 66.09Atk)
- Flickinger M.C., Drew S.W. 1999. Encyclopedia of Bioprocess Technology: Fermentation, Biocatalysis and Bioseparation. John Wiley and Sons, Inc. (ref. biblioteca UAB: 66.09)
- Turton R., Bailie R.C., Whiting W.B., Shaeiwitz J.A. 2003. Analysis, synthesis, and design of chemical processes. 2nd edition. Prentice Hall PTR. (ref. biblioteca UAB: 66.02Ana)
- Biotechnology: a multi-volume comprehensive treatise (edited by H.J. Rehm and G. Reed) 2nd completely revised edition. Weinheim, VCH, 1993-2001 (ref. biblioteca UAB: 5(03) 79 Bio).
- Kirk-Othmer Encyclopedia of Chemical Technology (recurs electrònic) (Accés restringit als usuaris de la UAB: <http://onlinelibrary.wiley.com/book/10.1002/0471238961>)