General Biology and Biochemistry

Code: 102443
ECTS Credits: 6

2025/2026

Degree	Type	Year
Chemical Engineering	OB	1
Chemical Engineering	OB	2

Contact

Name: Kirian Bonet Ragel

Email: kirian.bonet@uab.cat

Teachers

Marina Guillen Montalban

Teaching groups languages

You can view this information at the end of this document.

Prerequisites

There are no specific prerequisites for this subject.

Objectives and Contextualisation

To work in fields related to biotechnology or environmental engineering, chemical engineers must be able to combine the comprehension of the basic principles of biology with the problem-solving skills of an engineer. Thus, the main objective of this subject is to provide the basic biological concepts that can be applied to chemical engineering. In addition, we want to familiarize the student with the language used in the field of biology and biochemistry, with the aim of making them comfortable when working in areas such as biochemical engineering or environmental engineering, or working in multidisciplinary teams that include specialists in these areas.

Competences

Chemical Engineering

- Apply relevant knowledge of the basic sciences, such as mathematics, chemistry, physics and biology, and the principles of economics, biochemistry, statistics and material science, to comprehend, describe and resolve typical chemical engineering problems.

- Apply scientific method to systems in which chemical, physical or biological transformations are produced both on a microscopic and macroscopic scale.
- Communication
- Develop personal work habits.
- Develop thinking habits.
- Students must have and understand knowledge of an area of study built on the basis of general secondary education, and while it relies on some advanced textbooks it also includes some aspects coming from the forefront of its field of study.

Learning Outcomes

1. Analyse the biocatalyst, whether a cell or cell component, as a base of reactions in the production of goods and services. Conceptualise the importance of living elements, their structure and operations on the different levels of organisation, from the most elementary, such as the biochemical and molecular, to the associative effect in complex ecological organisms and systems.
2. Analyse the different levels of interaction in biological elements and the mechanisms for the capture of matter and energy that contribute to their self-generation.
3. Communicate efficiently, orally and in writing, knowledge, results and skills, both professionally and to non-expert audiences.
4. Describe the different applications to health, diet, the environment and industry of organisms and their components, and how their manipulation in production systems leads to these applications.
5. Develop a capacity for analysis, synthesis and prospection.
6. Develop independent learning strategies.
7. Develop scientific thinking.
8. Develop systemic thinking.
9. Efficiently translate the findings of basic biological research into engineering applications for society.
10. Efficiently use ICT for the communication and transmission of ideas and results.
11. Explain how organisms are the fruit of the expression of chemically based genetic information, which is transmitted and can be modified to adapt both to productive and utilisation needs.
12. Explain the relevant biological concepts for engineering initiatives.
13. Identify the available methods to create, analyse and manipulate molecules and biological systems.
14. Interpret the structure and function of organisms and their components.
15. Students must have and understand knowledge of an area of study built on the basis of general secondary education, and while it relies on some advanced textbooks it also includes some aspects coming from the forefront of its field of study.
16. Work autonomously.

Content

The contents of the course are divided into 7 topics:

- Topic 1 - From atom to cell. Biomolecules. Cell structure and viruses. Evolution and diversity.
- Topic 2 - Macromolecules. Structure of DNA and RNA. Structure of proteins. Structure of carbohydrates. Structure of lipids.
- Topic 3 - Enzymes. Enzyme function. Enzyme kinetics. Michaelis-Menten and inhibitions.
- Topic 4 - Membranes and membrane transport. The cell membrane. Transport across membranes.
- Topic 5 - Basic principles of metabolism. Bioenergetics. Control mechanisms of metabolic pathways.
- Topic 6 - Main metabolic pathways and their regulation. Degradation and utilization of sugars and lipids. Oxidative phosphorylation.
- Topic 7 - Transmission and modification of genetic information. DNA synthesis and repair. RNA metabolism. The genetic code and translation (protein synthesis).
- Topic 8 - Applications in engineering.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Lessons	30	1.2	1, 2, 4, 12, 11, 13, 14
Problems and class activities	15	0.6	1, 2, 3, 4, 5, 12, 11, 13, 14, 9
Seminars	4	0.16	1, 2, 4, 7, 8, 6, 5, 12, 14, 9, 16
Type: Autonomous			
Problem solving	21	0.84	1, 2, 7, 8, 6, 5, 12, 10, 13, 9, 16
Study	71	2.84	1, 2, 4, 7, 8, 6, 5, 12, 11, 13, 14, 15, 9, 16

In-person sessions

In addition to lectures, face-to-face sessions will be used for the active resolution of problems and questions by students. Some sessions will require students to prepare content in advance, which will then be worked on in class. Assessment activities (seminars) will also be carried out during class time.

Moreover, quizzes may be conducted through the Virtual Campus as a method to support the integration and consolidation of knowledge acquired in class.

Independent problem solving
Individually and outside of class time, students will be required to work on and solve a problem presented in class.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Partial exams	50	5	0.2	1, 2, 4, 7, 8, 6, 5, 12, 11, 13, 14, 15, 9, 16
Problem solving and in-class evaluation activities	20	2	0.08	1, 4, 7, 8, 6, 5, 12, 10, 13, 9, 16
Synthesis exam	30	2	0.08	1, 2, 3, 4, 7, 8, 6, 5, 12, 11, 13, 14, 15, 9, 16

Evaluation Process and Scheduled Activities

Throughout the course, various evaluation activities will be carried out that will contribute to the final grade of the subject, obtained through continuous assessment. The content of exam-type activities will correspond to

the material covered in both theory sessions and problem-solving and seminar sessions. Specifically, the evaluation activities will be:

- First midterm: Topics 1, 2, 3, and 4 (approximately). 25% of the final grade.
- Second midterm: Topics 5, 6, 7, and 8 (approximately). 25% of the final grade.
- Final synthesis exam: 30% of the final grade. A minimum score of 3.5 is required on this exam to pass the course.
- Autonomous problem-solving: 10% of the final grade. Non-recoverable. A minimum score of 4 is required on this activity to pass the course.
- In-class assessed activities (seminars + tests): 10% of the final grade. Non-recoverable.

The second midterm and the synthesis exam will be held on the same day.

In the exam evaluation, aspects such as exam presentation, writing, and basic errors will be considered, and the final grade may be adjusted accordingly based on the weighted average.

Recovery Process

If the student does not pass the course through the scores obtained in the midterms, the synthesis exam, and the problem-solving activity, a recovery exam may be taken, provided the student has participated in a set of activities representing at least two-thirds of the total course assessment. The recovery process will follow these rules:

- Midterm exams are eliminatory if the score is equal to or greater than 5.
- The final grade calculation during recovery will follow the same criteria as in continuous assessment, including the same minimum grade requirements.
- The autonomous problem-solving activity and in-class assessments are non-recoverable.

Review Procedure

For each assessment activity with an individual weight greater than 20%, a location, date, and time will be announced for in-person review of the activity. In this context, students may submit grade appeals, which will be evaluated by the course instructors. If the student does not attend the review session, the activity will not be reviewed later. For all other activities, students will have 48 hours from the moment the grade is published to request a review.

Grades

Awarding an Honors Distinction (MH) is at the discretion of the course instructor. UAB regulations stipulate that MH can only be awarded to students who have obtained a final grade equal to or above 9.00. A maximum of 5% of enrolled students may receive this distinction. In this course, to qualify for MH, in addition to the general criteria, students must have obtained a grade equal to or above 8.5 in each evaluable activity and must not have had to retake any exams.

If a grade below 5 is obtained in the Case Study, which is non-recoverable, the final grade for the course will be a Fail. The final grade will correspond to the lower value between the problem-solving grade and the average exam grade.

If, after the recovery process, the final grade is 5 or higher, but the synthesis exam grade is below 3.5, the student will receive a Fail, and the synthesis exam grade will be recorded as the final mark.

Students who, having failed the continuous assessment, do not attend the recovery exams will be marked as Not Assessable.

Irregularities: Cheating and Plagiarism

Cheating in any assessment activity will result in a course grade of 3 out of 10, with no possibility of taking any recovery exam.

Assessment of Repeating Students

No different assessment system is foreseen for repeating students.

Single Assessment

The content will correspond to what has been covered in both theory sessions and problem-solving/seminar sessions. The single assessment will consist of the following:

1. A synthesis exam, along with the first and second midterm exams, with the same format as for the rest of the students (75% of the final grade).

2. An autonomous and individual problem-solving activity (10% of the final grade).

The single assessment day will coincide with the date assigned for the second midterm, and any necessary recovery will take place on the scheduled recovery date.

Minimum grade requirements:

- Minimum score of 3.5 on the synthesis exam.

- Minimum score of 4 on the problem-solving activity.

Bibliography

- Alberts B, Bray D, Hopkin K, Johnson A, Lewis J, Raff M, Roberts K, Walter P. *Introducción a la biología celular* Editorial Médica Panamericana.
- Alberts B, Johnson A, Lewis J, Morgan, Raff M, Roberts K, Walter P. *Biología Molecular de la Célula*. Editorial Omega.
- McKee T, McKee JR. 2014. Bioquímica. *Las bases moleculares de la vida*. McGraw Hill Education. 7a Edició. https://bibcercador.uab.cat/permalink/34CSUC_UAB/1eqfv2p/alma991010606587806709
- Nelson, D.L., Cox, M.M. *Lehninger: principios de bioquímica*, Editorial Omega.
- Stryer, L. *Bioquímica*, Editorial Reverté.
- Voet D, Voet J.G., Pratt C.W. 2008. *Fundamentos de Bioquímica: La vida a nivel molecular*. Editorial Médica Panamericana.

Software

Virtual Campus
In some cases, the use of Excel or scientific calculators will be required.

Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this link. To consult the language you will need to enter the CODE of the subject.

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	211	Catalan	first semester	morning-mixed
(PAUL) Classroom practices	212	Catalan	first semester	morning-mixed
(SEM) Seminars	211	Catalan	first semester	morning-mixed
(SEM) Seminars	212	Catalan	first semester	morning-mixed
(TE) Theory	21	Catalan	first semester	morning-mixed