Universidad del País Vasco
Euskal Herriko Unibertsitatea

COURSE GUIDE 2026/27

Faculty 215 - Faculty of Chemistry
Cycle .

Degree GQUIMI20 - Bachelor's Degree in Chemistry
Year Fourth year

COURSE

26130 - Applied Biological Chemistry
Credits, ECTS: 6

COURSE DESCRIPTION

The subject is part of the Bioscience specialty of the Degree that corresponds to the Advanced Module. This specialty relies on the Chemistry knowledge related to Biosciences, such as, Biochemistry and Biology. The main objective of this course is to prepare the students to be part of multidisciplinary research groups.
In this course, students will learn concepts, methods and terms related to Biomedicine and Molecular Biology in order to understand the relevance of Chemistry in these fields and the role a Chemist can have in these research areas.
Knowledge will also be acquired through discussions and exercises that broaden the ability of the students to search for specialized information in other fields of knowledge different from Chemistry.
The subject starts from basic knowledge of Genetic Engineering; thus, basic biology knowledge (DNA, RNA, protein and cell structures, for instance) is considered enough to follow the course properly. Nonetheless, having passed Biology (1st year) and Biochemistry (2nd year) subjects is highly recommended.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

The subject is part of the Bioscience specialty of the Degree that corresponds to the Advanced Module and, as such, shares the transversal competences assigned to this module.
More specifically, this course develops the skills M03CM17, M03CM18 and M03CM20 transversal competencies and M03CM9, M03CM12, M03CM13 general competencies.
M03CM9 - Know the mechanisms and functions of relevant Biological Systems for Modern Chemistry.
M03CM12 - Possess knowledge of network tools and services that enable searches for information in the field of chemistry and similar fields.
M03CM13 - Explain phenomena and processes related to chemistry and similar fields in verbal presentations and/or written reports and in a comprehensible way in either of the two official languages of the Autonomous Community of the Basque Country or in English.
M03CM17 - Demonstrate observation, analysis and synthesis skills with a capacity for criticism and self-criticism.
M03CM18 - Demonstrate a capacity for learning and for autonomous work for professional development.
M03CM19 - Be able to manage, organize and plan chemical processes, applying criteria of quality and environmental conservation.
M03CM20 - Relate chemistry with other disciplines and understand its impact on the industrial and technological society and the importance of the industrial chemical sector.

The coordination of this subject with the rest of the Module corresponds to the Coordination Commission of the Degree in Chemistry.

Theoretical and Practical Contents

Theoretical content related to lectures is outlined below (acquired competences M03CM09, M03CM13, M03CM17 and M03CM20):

1. Introduction to Biotechnology.
2. Gene manipulation techniques and their relevance.
3. Cloning vectors.
4. DNA extraction.
5. Enzymes for DNA manipulation.
6. Cell transformation.
7. Vector designing.
8. Check-points for the cloning process.
9. Polymerase Chain Reaction.
10. High throughput sequencing and its applications.
11. Introduction to Medical Chemistry.

The rest of the theoretical contents will be selected by the students to perform an oral presentation. The possible topics are (among other topics related to Biochemistry, Biotechnology or Biology):
1. Hormones and signal transduction.
2. Antibiotics and druggability.
3. Cancer and mechanisms of antitumoral drugs.
4. Cancer cell transmission.

5. Nervous system and neurotransmissors.
6. Immune system.
7. Cell proliferation.
8. Model organisms.
9. Horizontal gene transference.
10. RNA-sequencing and ribosome profiling.

In Laboratory sessions (15 h, competences M03CM09, M03CM13, M03CM15, M03CM17 and M03CM18) the students will perform experimental processes explained in lectures (PCR, transformation, …) that are required to delete a gene from the genome of a cell culture.

TEACHING METHODS

For theoretical content of the course, the methodology will consist of the presentation of the subject through lectures. The lectures will be conducted using a dynamic and cooperative method that consist of starting every topic with a structural problem in order to activate student’s curiosity and previous knowledge. Then, theoretical content will be presented and at the end of the topic, the students will be challenged to solve different scenarios and problems in groups. Then, students will present their results and conclusions in an oral presentation in front of the rest of the class. The lecturer will evaluate and advise the students to correct misunderstandings and gradually improve their skills. Finally, correct development of the learning process will be evaluated using test questions and correct answers of the test will be discussed with all students.
Tutoring sessions will be used to answer individual questions.
Students will also prepare an oral presentation (1 h). The main objective of these sessions is to develop student’s autonomous work, improve their communication skills and enhance their knowledge of a topic of their choice in the table of contents of the subject. Students will be divided into groups and they will autonomously (but with the support of the teacher) prepare the presentation applying their criteria in searching, analyzing and synthesizing the information. At the end of the course, students will present their work in an oral presentation in front of the rest of the class. The lecturer will evaluate and advise the students to correct misunderstandings and improve their skills.
Practical laboratory work will be carried out in 3-4-hour sessions in the afternoons. In these sessions, students will learn some standard procedures and protocols related to the theoretical content of the subject. Furthermore, during these sessions some problems will be proposed and solved so that they will be able to solve other problems in the future.

TYPES OF TEACHING

Types of teaching	M	S	GA	GL	GO	GCL	TA	TI	GCA
Hours of face-to-face teaching	40	5		15					
Horas de Actividad No Presencial del Alumno/a	60	12		18					

Legend:
M: Lecture-based — S: Seminar — GA: Applied classroom-based groups
GL: Applied laboratory-based groups — GO: Applied computer-based groups — GCL: Applied clinical-based groups
TA: Workshop — TI: Industrial workshop — GCA: Applied fieldwork groups

Evaluation methods

- Continuous evaluation
- End-of-course evaluation

Evaluation tools and percentages of final mark

- Written test, open questions 60%
- Exercises, cases or problem sets 10%
- Oral presentation of assigned tasks, Reading¿ 30%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

Evaluation methods:
- Continuous evaluation
- End-of-course evaluation

Evaluation tools and percentages of final mark
- Written test, open questions 60%
- Exercises, cases or problem sets (laboratory notebook) 10%
- Oral presentation of assigned tasks, 30%

In order to ensure an integral learning process a minimum of 45% of the maximum qualification will be compulsory in every evaluation tool.

Ordinary Evaluation: evaluation of theoretical-practical and laboratory activities.

Evaluation of the theoretical contents will be through a final exam on all the subjects. Written tests will represent 60% of the final mark. In the written test, students are requested to answer questions with acquired knowledge, reasoning and with correct use of scientific language and vocabulary.
Assessment of seminars (oral presentations) and work proposed: each student will make an oral presentation on a theme of the theoretical content proposed by the students. Along with the theoretical content of the presentation, communication skills, supporting multimedia resources and corporal expression will be assessed. The oral presentation will represent 30% of the final mark.
Evaluation of laboratory sessions will be through evaluation of the student’s aptitude and the laboratory notebook written individually by the students. This part will represent 10% of the final mark.
If the students do not attend the exam, it will be graded as not sat.

A request for evaluation, through a single test or a final evaluation, will be sent to the teaching staff within 9 weeks of the start of the term or course, in accordance with the content of chapter 2, article 8 of the Regulations governing student evaluation in undergraduate degrees of the UPV/EHU. This will consist of an examination on all the theoretical-practical content of the subject.

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

This will consist of an examination on all the theoretical-practical content of the subject.

MANDATORY MATERIALS

The use of the platform eGela will be mandatory.

BIBLIOGRAPHY

Basic bibliography

- Molecular Biology of the Gene. Watson, Baker, Bell, Gann, Levine, Losick: Cshl Press. Pierson, Seventh Edition, 2013
- Molecular cell biology. Seventh Edition. Lodish, Berk, Matsudaira, Kaiser, Krieger, Scoctt, Zipursky, Darnell: Ed. W.H FREEMAN AND CO.2013
- Biomedical Chemistry: Applying Chemical Principles to the Understanding and Treatment of Disease. Paul F. Torrence. Wiley-Blackwell, 2000.
-Bioassay Techniques for Drug Development. Atta-ur Rahman, MI Choudhary, W Thompson. Taylor-Francis, 2005

Detailed bibliography

This will be given at the beginning of the course.

Journals

-Nature: http://www.nature.com/
-Science: http://www.sciencemag.org/
-Cell: http://www.cell.com/
-Plos: https://www.plos.org/iko da.

Web sites of interest

Adieraziko da.

OBSERVATIONS