COURSE DATA

Data Subject	
Code	34191
Name	Biology
Cycle	Grade
ECTS Credits	6.0
Academic year	2022 - 2023

Study (s)

Degree	Center	Acad. year	Period
1110 - Degree in Chemistry	Faculty of Chemistry	1	Second term

Subject-matter

Degree	Subject-matter	Character
1110 - Degree in Chemistry	5 - Biología	Basic Training

Coordination

Name	Department
CARAZO FERRANDIS, PAU	355 - Zoology

SUMMARY

Biology is a 6-ECTS-credit subject of the Chemistry Degree. It is taught in the second semester of the first year of the Degree. It is a part of the set of subjects that try to make the future graduates in Chemistry dominate and integrate the basic general knowledge of the Sciences branch.

Biology is a discipline whose objective for students of this Degree is to show that living beings are entities where chemical processes are developing, cellular interactions are progressing and responses to other organisms and the environment that surrounds them are occurring, all them from the perspective of the evolution. The intrinsic value of biodiversity makes its knowledge and conservation necessary. In addition, advances in cellular, molecular and functional aspects of organisms have allowed the development of useful applications in environmental monitoring and remediation, among others. The competences acquired through this subject constitute the basis for the students to assess the influence of human activity on nature, predispose them favorably towards environmental issues and lead them to acquire a commitment to conservation and sustainable use of natural resources.

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 advisable that students have studied the specific subjects recommended in the degree of science bachelor.

OUTCOMES

1108 - Degree in Chemistry

- Develop capacity for analysis, synthesis and critical thinking.
- Show inductive and deductive reasoning ability.
- Demonstrate leadership and management skills, entrepreneurship, initiative, creativity, organization, planning, control, leadership, decision making and negotiation.
- Solve problems effectively.
- Demonstrate ability to work in teams both in interdisciplinary teams and in an international context.
- Demonstrate ability to communicate information, ideas, problems and solutions to both specialist and non-specialist audiences and using information technology, as appropriate.
- Demonstrate a commitment to ethics, equality values and social responsibility as a citizen and as a professional.
- Learn autonomously.
- Demonstrate the ability to adapt to new situations.
- Acquire a permanent sensitivity to quality, the environment, sustainable development and the prevention of occupational hazards.
- Show knowledge of the structure and reactivity of the main classes of biomolecules and the chemistry of the main biological processes.
- Demonstrate knowledge and understanding of essential facts, concepts, principles and theories related to the areas of chemistry.
- Solve qualitative and quantitative problems following previously developed models.
- Interpret data from observations and measurements in the laboratory in terms of their significance and the theories that underpin them.
- Relate theory and experimentation.
- Recognise and evaluate chemical processes in daily life.

- Develop sustainable and environmentally friendly methods.
- Relate chemistry with other disciplines.
- Students must have acquired knowledge and understanding in a specific field of study, on the basis of general secondary education and at a level that includes mainly knowledge drawn from advanced textbooks, but also some cutting-edge knowledge in their field of study.
- Students must be able to apply their knowledge to their work or vocation in a professional manner and have acquired the competences required for the preparation and defence of arguments and for problem solving in their field of study.
- Students must have the ability to gather and interpret relevant data (usually in their field of study) to make judgements that take relevant social, scientific or ethical issues into consideration.
- Students must be able to communicate information, ideas, problems and solutions to both expert and lay audiences.
- Students must have developed the learning skills needed to undertake further study with a high degree of autonomy.
- Express oneself correctly, both orally and in writing, in any of the official languages of the Valencian Community.
- Have basic skills in the use of information and communication technology and properly manage the information obtained.

LEARNING OUTCOMES

The previous section includes the competences contained in the document VERIFICA. This subject addresses part of the learning results of the subject Biology that allow to acquire both specific knowledge of chemistry, cognitive skills and general skills recommended by the EUROPEAN CHEMISTRY THEMATIC NETWORK (ECTN) for the Chemistry Eurobachelor® Label. The following table lists the learning outcomes acquired in the subject Biology related to the competences of the Degree in Chemistry.

SPECIFIC KNOWLEDGE OF CHEMISTRY	
The learning process should allow the degree graduates to demonstrate:	
	Competences of the subject Biology that contemplate the learning outcomes EUROBACHELOR®
The structure and reactivity of important classes of biomolecules and the chemistry of important biological processes	Show knowledge of the structure and reactivity of the main classes of biomolecules and the chemistry of the main biological processes. (CE12). Relate chemistry with other disciplines. (CE26).

COMPETENCES AND COGNITIVE SKILLS	
The learning process should allow the degree graduates to demonstrate:	
	Competences of the subject Biology that contemplate the learning outcomes EUROBACHELOR®
Competences to present and argue scientific issues orally and in writing to a specialized audience.	Relate chemistry with other disciplines. (CE26). Prepare reports, surveys and industrial and environmental projects in the field of chemistry. (CE27). Demonstrate ability to communicate information, ideas, problems and solutions to both specialist and non-specialist audiences and using information technology, as appropriate. (CG6). Students must be able to communicate information, ideas, problems and solutions to both expert and lay audiences. (CB4).

GENERAL COMPETENCES	
The learning process should allow the degree graduates to demonstrate:	
	Competences of the subject Biology that contemplate the learning outcomes EUROBACHELOR®
Ability to apply practical knowledge to solve problems related to qualitative and quantitative information.	Solve problems effectively. (CG4). Solve qualitative and quantitative problems following previously developed models. (CE14).

	Relate theory and experimentation. (CE22). Recognise and evaluate chemical processes in daily life. (CE23). Understand the qualitative and quantitative aspects of chemical problems. (CE24).
Competences in information management, in relation to primary and secondary sources, including information retrieval through on-line searches.	Demonstrate ability to communicate information, ideas, problems and solutions to both specialist and non-specialist audiences and using information technology, as appropriate. (CG6). Have basic skills in the use of information and communication technology and properly manage the information obtained. (CT2).
Ability to analyse materials and synthesize concepts.	Develop capacity for analysis, synthesis and critical thinking. (CG1). Show inductive and deductive reasoning ability. (CG2). Students must have the ability to gather and interpret relevant data (usually in their field of study) to make judgements that take relevant social, scientific or ethical issues into consideration. (CB3).
Ability to adapt to new situations and make decisions.	Demonstrate the ability to adapt to new situations. (CG9). Recognise and analyse new problems and plan strategies to

	solve them. (CE15). Students must have the ability to gather and interpret relevant data (usually in their field of study) to make judgements that take relevant social, scientific or ethical issues into consideration. (CB3).
Skills related to information technology such as word processing, spreadsheet, recording and storage of data, internet use related to the subjects.	Demonstrate ability to communicate information, ideas, problems and solutions to both specialist and non-specialist audiences and using information technology, as appropriate. (CG6). Have basic skills in the use of information and communication technology and properly manage the information obtained. (CT2).
Planning and time management skills.	Develop capacity for analysis, synthesis and critical thinking. (CG1). Demonstrate leadership and management skills, entrepreneurship, initiative, creativity, organization, planning, control, leadership, decision making and negotiation. (CG3). Solve problems effectively. (CG4).
Interpersonal skills to interact with other people and get involved in team work.	Demonstrate ability to work in teams both in interdisciplinary teams and in an international context. (CG5). Demonstrate a commitment to

	ethics, equality values and social responsibility as a citizen and as a professional. (CG7). Demonstrate the ability to adapt to new situations. (CG9).
Competences in oral and written communication, in one of the main European languages, in addition to the language of the country of origin.	Demonstrate ability to work in teams both in interdisciplinary teams and in an international context. (CG5). Demonstrate a commitment to ethics, equality values and social responsibility as a citizen and as a professional. (CG7). Express oneself correctly, both orally and in writing, in any of the official languages of the Valencian Community. (CT1). Students must be able to communicate information, ideas, problems and solutions to both expert and lay audiences. (CB4). Have basic skills in the use of information and communication technology and properly manage the information obtained. (CT2).
Study skills necessary for professional development. These will include the ability to work autonomously.	Demonstrate leadership and management skills, entrepreneurship, initiative, creativity, organization, planning, control, leadership, decision making and negotiation. (CG3). Demonstrate ability to work in teams both in interdisciplinary teams and in an international context. (CG5).

	Learn autonomously. (CG8). Demonstrate the ability to adapt to new situations. (CG9). Students must have developed the learning skills needed to undertake further study with a high degree of autonomy. (CB5).
Ethical commitment to the European Code of Conduct: http://ec.europa.eu/research/participants/data/ref/h2020/other/hi/h2020-ethics_code-of-conduct_en.pdf	Acquire a permanent sensitivity to quality, the environment, sustainable development and the prevention of occupational hazards. (CG10). Demonstrate a commitment to ethics, equality values and social responsibility as a citizen and as a professional. (CG7). Students must have the ability to gather and interpret relevant data (usually in their field of study) to make judgements that take relevant social, scientific or ethical issues into consideration. (CB3).

These learning outcomes must allow, when the subject of "Biology" ends, the student must be able to:

1. Know and understand the organization levels of living beings.

2. Acquire solidity in the knowledge of the structure and function of biomolecules.

3. Know and understand the cellular structure and the foundations of metabolism.

4. Know the processes of replication, transcription and translation of hereditary material.

5. Know and understand the foundations of biological diversity from an evolutionary perspective.

6. Know and understand the ecological principles of populations, communities and ecosystems.

7. Know and value the biodiversity and its mechanisms of destruction and conservation (OD6, ODS7,ODS12, ODS13, ODS14 and ODS15).

8. Become familiar with experimental work and basic laboratory techniques.

9. Solve problems and questions through the integrated application of the acquired knowledge.

10. Understand, analyse and assess scientific texts.

11. Properly use of informative scientific language.

12. Participate in work teams and in multidisciplinary contexts (ODS4, ODS5 and ODS10).

13. Prepare, defend and expose seminars that involve research, integration, analysis and synthesis of information.

14. Know and apply the scientific method.

DESCRIPTION OF CONTENTS

1. Introduction to Biology.

Introduction to Biology. Relationship with Chemistry. Life and its properties. Levels of biological organization. Research Methods. -omic techniques.

2. Chemical basis of Life: Biomolecules

Elements of Life: the biomolecules. Water; structure of the molecule and properties. The carbon chemistry. Structure and function of macromolecules. Carbohydrates. Lipids. Peptides and proteins. Nucleotides and nucleic acids.

3. Organization of the cells

The cell. Prokaryotic cell and Eukaryotic cell. Structure and function of cell organelles. Biological membranes.

4. Metabolism and Energy

Introduction to cellular metabolism. Characteristics of metabolic reactions. ATP and energy transfer. Fermentation. Respiration. Photosynthesis.

5. Continuity of Life: biology of the heredity, reproduction and development

Molecular bases of heredity. DNA replication and repairing. Flow of genetic information. Transcription, translation and genetic code. Recombinant DNA technology. Genomes edition. Basic principles of heredity. Mendelian genetics. Mitosis and cell cycle. Meiosis. Reproduction: definition and types. Fertilisation and ovular activation. Cell determination.

6. Biological diversity: the Tree of Life

Theories about the origin of Life. The species concept. Speciation and macroevolution. Evolution, natural selection and sexual selection. Domains and Kingdoms. Prokaryotes. Protists. Plants. Structural and functional organization of plants. Fungi. Animals. Structural and functional bauplans of animals. The internal environment and its regulation. Responses to stress. Biotechnology of organisms applied to Chemistry.

7. Organisms and Environment

Introduction to Ecology. Ecology of individuals, populations and communities. Ecosystems. Energy flows and material cycles. Conservation and restoration.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	48,00	100
Tutorials	8,00	100
Laboratory practices	4,00	100
Study and independent work	90,00	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

Teaching methodology is based on various teaching-learning activities:

Theory sessions. Masterful exposition sessions in which the active participation of students is stimulated are the main activity. They are taught sequentially throughout the corresponding four-month period of the academic year. The thematic contents are completed with classroom activities related to question resolution, case studies, etc. The used audiovisual material may include presentations with computer programs and / or video projections and / or materials from www sources. Aula Virtual of the subject is the channel of information and distribution of teaching materials as well as of any other material of reinforcement, consultation or bibliographical guidance.

Group seminars. Groups consisting of 2-3 students will be organized to prepare a bibliographic research work about a scientific topic in the context of the subject. The professor will supervise the preparation and presentation through periodic meetings. The seminar also includes the oral presentation of the work during 15 minutes in which all the members of the group will participate. The list of groups as well as the chronogram of the written works and oral presentations will be established at the beginning of the course.

Group tutorials. Attended activities in a small group, in which concepts correlated with the theoretical matter will be established and deepened. The attainment of transversal skills such as discussion and confrontation of ideas will be encouraged. Prior to some sessions, professor can request the delivery of

resolved questions and problems.

Laboratory sessions. Two practical sessions in laboratory of two hours each will be arranged. Contents will deal with key basic concepts in Biology. The students will develop the proposed activities after having read a handbook with a theoretical introduction and the protocols to follow. Each practice includes a questionnaire that the student must deliver along the course.

Complementary activities. It is recommended to attend conferences that take place in centers of the Science Campus along the semester. Also reading and analysing scientific books and texts is another activity to consider. These and other similar activities will be voluntary work and they must have a prior agreement with the teaching staff.

EVALUATION

The evaluation of the subject will be made taking into account the planned activities and assigning a percentage to each of them that overall will make up the final mark with a score of 10 points.

- **Theory**: A written exam with several potential options: essay questions, multiple choice test, true / false assumptions and concept relationships. The content may include theoretical issues, practical assumptions and problems. Students must adequately identify themselves to access to the exam room.

The theory exam has a value of 60% of the final mark

- **Group seminars**: This activity is part of the evaluation of the subject, but it is voluntary for all enrolled students. It is a non-recoverable activity in the second call.

The text work and the oral group presentation have a value of 10% of the final mark.

- **Group tutorials**: This activity is part of the evaluation of the subject, but it is voluntary for all enrolled students. It is a non-recoverable activity in the second call.

Attendance and active participation, and tasks completion when appropriate, have a value of 15% of the final mark.

- **Laboratory practices**: This activity is part of the evaluation of the subject, but it is voluntary for all enrolled students. It is a non-recoverable activity in the second call.

Attendance and active participation, and worksheet completion, have a value of 10% of the final mark.

- **Participation and involvement in training activities** have a value of 5% of the final mark.

Further to the participation and involvement in the teaching-learning process, in this section the student can add complementary activities (conferences, books, etc.). It is a non-recoverable activity in the second call.

A minimum qualification of 40% in the Theory section will be required to pass the subject. It will not be necessary to pass a specific qualification in the rest of the activities such as Seminars, Tutorials, Practices and Participation.

The subject will be passed when, after adding the Theory qualification plus the qualifications of the rest of the activities, a final mark equal to or greater than 5 points is obtained.

The second course call will consist only of the theory exam, to which will be added the qualifications of the rest of activities already carried out during the same course and not recoverable in the second call. So, the qualifications of the activities, all except Theory, will be saved for the second call.

No qualifications will be reserved for other subsequent academic years in the Theory, Tutorials and Complementary Activities sections. The mark will be saved only for the following academic year in the case of Group Seminars and Laboratory Practices.

REFERENCES

Basic

- CAMPBELL, N.A., REECE, J.B. Biología. Séptima edición. Madrid: Editorial Médica Panamericana, 2007. 1532 p. ISBN 978-84-7903-998-1.
- AUDESIRK, T., AUDESIRK, G., BYERS, B.E. Biología. La Vida en la Tierra. Con fisiología. Novena edición. México: Pearson, 2013. 1000 p. ISBN 978-607-32-1526-8.
- SADAVA, D, HELLER, H.C., ORIANS, G.H., PURVES, W.H., HILLIS, D.M. Vida, la Ciencia de la Biología. Octava edición. Madrid: Editorial Médica Panamericana, 2009. 1376 p. ISBN 978-950-06-8269-5.
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