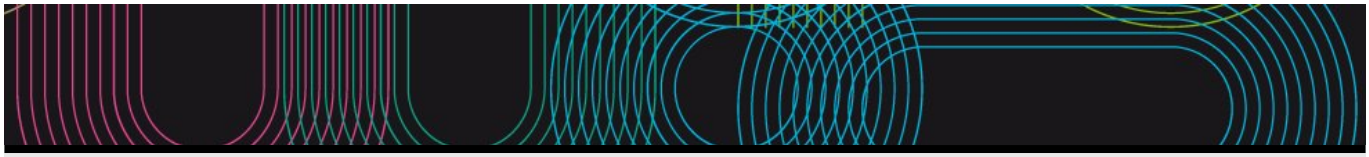

IDENTIFYING DATA

Chemistry: Chemistry applied to biology

Subject	Chemistry: Chemistry applied to biology			
Code	V02G031V01105			
Study programme	Grado en Biología			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	1st
Teaching language	#EnglishFriendly Spanish English			
Department				
Coordinator	Lorenzo Fernández, Paula Salonen , Laura			
Lecturers	Lorenzo Fernández, Paula Salonen , Laura			
E-mail	lauramaria.salonen@uvigo.es paula.lorenzo@uvigo.es			
Web				
General description	General chemistry oriented to Biology. Terms of English Friendly program. International students may apply to teachers: (a) materials and bibliography for the study of the subject in English, b) attending tutorials in English, c) tests and evaluations in English.			

Training and Learning Results

Code	
A1	Students should prove understanding and knowledge in this study field that starts in the Secundary Education and with a level that, even though it is suppported in advanced books, also includes some aspects that involve knowledge from the vanguard of the study field.
A3	Students should prove ability for information-gathering and interpret important data (usually within their study field) to judge relevant social, scientific or ethical topics.
A4	Students should able to communicate information, ideas, issues and solutions to all audiences (specialist and unskilled audience).
B1	Developing autonomous learning by identifying their own training need and organizing and planning tasks and time.
B2	Manage scientific-technical information using diverse and reliable sources. Analyze data and documents and interpret them critically and rigorously, including considerations on their social relevance and in the professional field of Biology.
B6	Develop analysis and synthesis, critical reasoning and argumentation skills, applying them in Biology and other scientific-technical disciplines.
C1	Solve problems by applying the scientific method, the concepts and terminology specific to biology, mathematical models and statistical and computer tools.
C12	Writing reports and technical dossiers, as well as directing and executing projects on topics related to biology and its applications.
D1	Understand the meaning and use of the gender perspective in the different fields of knowledge and in professional practice with the aim of achieving a fairer and more equal society.
D4	Collaborate and work in teams or multidisciplinary groups, promote negotiation skills and the ability to reach agreements.

Expected results from this subject

Expected results from this subject	Training and Learning Results		
Know and understand the molecular structure of biological compounds and the importance of intermolecular and intramolecular bonds.	A1 A3	B6	
Recognize the different types of chemical bonds, as well as their relationship with the structure of molecules and the macroscopic properties of substances.	A1 A4	B1 B6	C1

Know general concepts about chemical reactions.	A4	B1 B2 B6		
Recognize especially the acid-base and oxidation-reduction reactions, as well as their application to biological processes.	A1 A3 A4	B2 B6	C1	
Get an overview of the chemical compounds present in Nature and their stereochemical characteristics.	A1 A3 A4	B1 B2 B6	C12	D4
Enumerate the regulations and health and safety techniques in a chemical laboratory.	A3	B6	C1 C12	D1 D4
Identify the basic material and instrumentation in a chemical laboratory.	A1 A3 A4	B1 B6	C1 C12	D1 D4
Identify and understand the basic techniques in a chemical laboratory.	A1 A3 A4	B1 B6	C1 C12	D1 D4
Know the labeling, packaging and storage procedures of chemical reagents and solvents.	A4	B1 B2 B6	C1 C12	D4
Differentiate the different types of chemical waste generated in a laboratory.	A4	B1 B2 B6	C1 C12	D4
Apply knowledge related to Chemistry in the field of Biology.	A1 A3 A4	B1 B2 B6	C1 C12	
Obtain and handle information, develop experiments and interpret the results.	A3 A4	B1 B2 B6	C1 C12	D1 D4
Understand the social projection of Chemistry and its impact on the professional practice of a biologist.	A4	B1 B2 B6		D1 D4

Contents

Topic	
Topic 1. Structure of matter and chemical bond.	1. Classification of matter. Distribution of the elements in Earth and chemical composition of living matter. Molecular structure. 2. Chemical bond. Intermolecular forces in biomolecules.
Topic 2. Chemical compounds in nature. Stereochemistry.	1. Main families of chemical compounds in natural environment. 2. Chirality, stereogenic centers. Enantiomers and diastereoisomers. Tridimensional representation of the chemical structures. 3. Chemical reactions in biological environments.
Topic 3. Solution process. Colloids.	1. Types of solutions. Units of concentration. Colligative properties. Osmosis in biological processes. 2. Colloids. Structure and properties of colloidal systems.
Topic 4. Reactions and acid-base equilibrium. Redox.	1. Acids and bases. The pH. Buffer solutions. Regulation of pH in body fluids. 2. Redox reactions. Redox processes in the cellular metabolism.
PRACTICAL SESSIONS PRACTICE 1	1. SECURITY RULES IN THE CHEMICAL LABORATORY. 2. PREPARATION OF SOLUTIONS.
PRACTICE 2	LIQUID-LIQUID EXTRACTION. RECRYSTALLIZATION OF CAFFEINE.
PRACTICE 3	EXTRACTION OF LIMONENE FROM ORANGE PEEL.
PRACTICE 4	BUFFER SOLUTIONS: PREPARATION AND EVALUATION OF BUFFERING CAPACITY.
PRACTICE 5	OXIDATION-REDUCTION REACTIONS. EVALUATIONS WITH A PERMANGANATE POTASSIUM SOLUTION.

Planning

	Class hours	Hours outside the classroom	Total hours
Laboratory practical	15	7	22
Seminars	10	20	30
Lecturing	23	46	69
Problem and/or exercise solving	0	15	15
Problem and/or exercise solving	2	12	14

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies	
	Description
Laboratory practical	Application of laboratory techniques in practical problems related to the subject.
Seminars	A series of proposed exercises by the teacher will be solved in the classroom.
Lecturing	Explanation of the units.

Personalized assistance	
Methodologies	**Description**
Seminars	In relation to the resolution of problems and doubts that may arise on the subject, personalized attention may be requested from students (tutorials), which will be carried out by prior appointment (arranged face-to-face modality), or through the virtual office of the teachers responsible (remote campus)

Assessment			
	Description	Qualification	Training and Learning Results
Laboratory practical	During the laboratory practices, the teacher will evaluate both the correct application as well as the skills in the instrumental techniques developed by each student in each session. This will amount to 5% of the overall score. In addition, the student must solve, through the MOOVI platform, a questionnaire related to the concepts and techniques developed in each session. In total there will be 5 questionnaires (one for each training session), the average grade of which will contribute to 10% of the overall grade.	15	
Seminars	The teacher will propose questions or short problems (deliverables) through the MOOVI platform to be resolved throughout the four-month period (10% of the overall mark). Active participation in the seminars will contribute to 5% of the overall grade.	15	A1 B2 C1 A3
Problem and/or exercise solving	Exam 1: There will be an exam of topics 1 and 2 during the four-month period. The exam is divided into two parts: - Multiple choice questions, which will evaluate the theoretical knowledge acquired by the student of both topics. - Problem solving part related to the subject matter of both topics.	35	A1 B1 C1 A3 B2 A4 B6
Problem and/or exercise solving	Exam 2: There will be an exam of topics 3 and 4 at the end of the four-month period. The exam is divided into two parts: - Multiple choice questions, which will evaluate the theoretical knowledge acquired by the student of both topics. - Problem solving part related to the subject matter of both topics.	35	A1 B2 C1 A3 B6 A4

Other comments on the Evaluation

CONTINUOUS EVALUATION:

IN ORDER TO PASS THE SUBJECT, THE STUDENT MUST OBTAIN AN OVERALL GRADE EQUAL TO OR GREATER THAN 5.

1) The continuous evaluation supposes an overall grade ofthe subject resulting from weighting the grade of each of the activities as indicated above (laboratory practices, seminar, problem solving and/or exercises: exams 1 and 2). Attendance at a practice session or a seminar test implies that the student is being evaluated, so their grade in the minutes cannot be "not presented".
2) The average with the grade of laboratory practices and seminar (in the indicated percentage) will only be made if the average grade of exams 1 and 2 is equal to or greater than 3.5 points. A grade lower than 3.5 supposes suspending the subject and will be the grade that appears in the minutes.
3) Attendance at laboratory practices is mandatory, so non-attendance means suspending the subject. In the case of obtaining a grade lower than 5 in the practices, the grade can be recovered in the second opportunity exam (July). The grade of practices passed in previous courses will be saved.
4) 2nd CHANCE: The grades of the activities passed in the first opportunity will be saved for the second opportunity. For this second opportunity, the same requirements described in point 2 are established, being, in this case, the exam grade that limits the average with the rest of the activities. In addition, this call will have a specific test for the recovery of the practice grade if necessary.
GLOBAL ASSESSMENT:
The students who renounce the continuous evaluation may request global evaluation in the period established by the center. This evaluation will be carried out on the official dates of the first and second opportunity.
IN ORDER TO PASS THE SUBJECT, THE STUDENT MUST OBTAIN AN OVERALL GRADE EQUAL TO OR GREATER THAN 5.

5) The average will only be made with the grade ofl aboratory practices when the grade of the exam is equal to or greater than 4.25 points (calculated taking into account the overall grade of 85% for the exam and 15% for the grade of practices). A grade lower than 4.25 supposes suspending the subject and will be the grade that appears in the minutes.
6) Attending the laboratory practices is mandatory, so non-attendance will mean the suspension of the subject. In the case of obtaining a grade lower than 5 in the practices, the grade can be recovered in the official exam. The grade of practices passed in previous courses will be saved.
7) 2nd CHANCE: For this second chance, the same requirements described in point 5 are established.
The dates of the exams will be published on the website of the faculty (http://bioloxia.uvigo.es/es/docencia/examenes). Schedules are available at http://bioloxia.uvigo.es/es/docencia/horarios

Sources of information

Basic Bibliography

R. Chang, **Química General**, 12ª Ed McGraw-Hiil, Madrid 2017,
R. H. Petrucci, **Química General**, 11ª Ed Person Educación, S. A. Madrid 2017,
Kenneth W. Whitten et al, **Química**, 10ª Ed México D.F. : Cengage Learning 2015,
R. Chang, **Chemistry**, 7ª ed New York : McGraw Hill Education 2002,

Complementary Bibliography

3D structures of biological molecules, http://www.biotopics.co.uk/JmolApplet/jcontentstable.html,

Recommendations