Universitat Autònoma de Barcelona

2019/2020

Integrated Laboratory Class 1

Code: 100886
ECTS Credits: 3

Degree	Type	Year	Semester
2500252 Biochemistry	OB	1	1

Contact

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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

Teachers

Regina Martínez Barchino
Elena Ibáñez de Sans
Guillem Prats Ejarque
Albert Beardo Ricol
Roger Bofill Arasa
F. Xavier Alvarez Calafell

Prerequisites

The student must attend simultaneously or have taken the theory subjects, which are taught during the same semester, corresponding to the contents of the practices of this subject,

In order to attend the laboratory classes it is necessary for the student to justify having passed the biosecurity and security tests that you will find in the Virtual Campus and be knowledgeable and accept the operating rules of the Bioscience Laboratories.

The test is answered in the corresponding space of the Virtual Campus and the information that must be consulted is in the communication space of the Degree in Biochemistry.

It is advisable for students to review the theoretical contents on which this subject is based

Objectives and Contextualisation

The subject Integrated Laboratory 1 is part of a set of six subjects that are distributed throughout the first six semesters of the Degree in Biochemistry.

The training objective of these subjects is the acquisition of practical skills by the student.

The contents are organized in increasing order of complexity, associated with the needs and acquisition of theoretical contents.

During the Integrated Laboratory 1 the student acquires practical competences in the contents:

- Physical

- Cellular Biology

- Basic Instrumental Techniques

- Fundamentals of Chemistry

- Mathematics.

Practices in the laboratory focus on learning basic techniques specific to each field and on the characteristics of working in the laboratory.

Competences

- Apply general laboratory security and operational standards and specific regulations for the manipulation of different biological systems.
- Apply the principal techniques used in biological systems: methods of separation and characterisation of biomolecules, cell cultures, DNA and recombinant protein techniques, immunological techniques, microscopy techniques, etc.
- Collaborate with other work colleagues.
- Design and prepare laboratory protocols, including health and safety aspects.
- Think in an integrated manner and approach problems from different perspectives.

Learning Outcomes

1. Collaborate with other work colleagues.
2. Identify the cell systems that are useful for studying biochemistry and molecular biology.
3. Monitor and interpret experiment protocols from a critical perspective.
4. Think in an integrated manner and approach problems from different perspectives.
5. Use the appropriate methodology for studying the different types of biological samples.
6. Use the basic techniques for handling and analysing proteins and nucleic acids.
7. Use the basic techniques for studying biomolecules in a chemistry laboratory.
8. Use the established methods for eliminating the different types of waste products from a biochemistry and molecular biology laboratory.

Content

The subject is structured in 4 types of contents.

Cell Biology

Contents:

Practice 1 (2h). Introduction to the optical microscope and observation of plant cells. Description of the optical microscope elements and microscope usage phonemes. Obtaining temporary preparations for different vegetable plants (pepper, Elodea) observation of the morphology of plant cells and their main components: cell wall, nucleus, chloroplasts, chromoplasts, plasmodesms.

Practice 2 (2h). Observation of animal cells through optical microscope. Observation of the morphology of the different types of animal cells: cells of the buccal mucosa, fibroblasts and sperm.

Practice 3 (2h). Electronic microscopy. Fonts of electronic microscopy. Recognition and measurement of different structures is organic cell and micrographs of SEM and TEM.

Practice 4 (2h). Osmosis and simple diffusion. Studying the Phenomenon of the Osmoses in Cells of a leaf of Elodea exposes a different concentration of NaCl. Study of the simple diffusion of the alcohols through the membrane of cells of a leaf of Elodea.

Practice 5 (2h). The mitotic cell division. Obtención de preparaciones temporales de títulos vegetales para la observación y reconocimiento de las diferentes etapas de la mitosis y la determinación de la duración.

Practice 6 (2h). The meiotic cell division. Observation of the different phases of the meiotic cycle of insect spermatogenesis.

Basic Instrumental Techniques

Continguts

Practice 1 (4h).

Determination of the concentration of glucose by a metric dye.

Analysis of an absorption spectrum.

Practice 2 (4h).

Filtration gel chromatography: separation of hemoglobin from vitamin B12 and dextra blue.

Separation of proteins by electrophoresis in SDS. Preparation of the gel (which is far from the drawer).

Practice 3 (4h).

Determination of proteins of animals protected by SDS electrophoresis (Example: actin and myosin).

Phonemes of Chemistry

Continguts

Practice 1 (4h)

Determination of the degree of acidity of a commercial vinegar.

Concept: Assessment of a weak acid.

Practice 2 (4h)

Separation of a mixture of Benzoic Acid, 1,3-dinitrobenzene and Aniline

Simple extraction concept: Extraction with a basic aqueous and acid phase

Physics

Continguts

Practice 1 (3h)

Instruments for measuring lengths: the little king, the Palmer and the spherometer.

Instruments of mass measurement: the granary balance.

Assimilation of error concepts, precision and magnitude of a measure.

Practice 2 (3h)

Analysis of the sedimentation processes of a low number of Reynolds.

Determination of the viscosity coefficient of liquids from the Stokes stage.

Practice3 (3h)

Assimilation of electromagnetic phenomena that occur in the mass spectrometer.

Determination of the temperature of the earth / mass of electricity.

Practice 4 (4h)

Study of the different types of penetration of alpha, beta and gamma radiation.

Analysis of the absorption capacity of radiation (shielding) by different materials.

Mathematics module

We will learn to carry out an algebraic manipulator by performing calculations and representing graphs of functions of one
Variable We will work on mathematical modeling of physical, chemical and biological phenomena.

Continguts
P1 (2h): Introduction: The syntax of the manipulator.
P2 (2h): Functions of a variable: its graphs, how to derive them, how to integrate them.
P3 (2h): Applications: Growth of the functions, maximum and minimum, convexity. Graphical representation of functions. Optimization issues.
P4 (2h): Differential equations. Applications
P5 (2h): Test of consolidation of contenders.

Methodology

The subject will be taught in the laboratory and in small groups of students

The attendance to the classes of this subject is obligatory since they imply an acquisition of competitions based on the practical work.

Practical classes of laboratory and data analysis.

The students carry out the experimental work in groups of 2 and under the supervision of the responsible professor.

The practical protocols and, if applicable, the questionnaires for response, will be available on the Virtual Campus of the subject.

Before beginning a practical session the student must have read the protocol and know therefore the objectives of the practice, the foundations and the procedures that must be carried out.

If so, you must know the specific safety and waste treatment measures.

In the practical sessions you have to take:

- Protocol and, if applicable, the questionnaire.

- A notebook to collect the information of the experimental work.

- Laboratory baton.

- Safety glasses.

- Permanent marker

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
practice sessions in the laboratory	55	2.2	1, 3, 2, 4, 8, 5, 7, 6
Type: Supervised			
tutor sessions	2.5	0.1	3, 2, 4, 8, 5, 7, 6
Type: Autonomous			
Study	5	0.2	3, 2, 4, 8, 5, 7, 6
questions resolution	5.25	0.21	3, 2, 4, 8, 5, 7, 6

Assessment

Cell Biology

The practices will be evaluated through questionnaires that students will have to answer at the end of each of the practical sessions. The final grade of the module will be obtained from the average grade of the 6 questionnaires
Students with two or more unexcused lack of assistance will receive a maximum score of 3.5 points and will not be able to carry out any recovery test, which implies that they will not be able to pass the subject of Integrated Laboratory 1.

Basic instrumental techniques

The practices will be evaluated taking into account:

The resolution of questionnaires in which it will be evaluated:

• Understanding the basics of experimental methods.

• The ability to process and analyze experimental data.

• The ability to interpret experimental results.

The follow-up of the experimental work in the laboratory in which it will be evaluated:

• Preliminary preparation work, especially in those practices that require previous calculations.

• The application of the general rules of safety and operation of a laboratory.

• The application of waste disposal processes.

• The ability to work as a team.

Maths:

20% of the note will be given by the attitude of the student during the practices. The remaining 80% is the result of a math problem solving problem with a computer.

Fundamentals of Chemistry

The assessment will be carried out by carrying out a brief questionnaire at the beginning of each practice onthe content that must be known by the students to carry it out (15% of the total);

The delivery of a final report on the practice carried out at the end of each session in the laboratory.

Physics

The assessment will be done by answering questions about each practice.

The final evaluation of the subjectwill be obtained from the weighted average of the evaluation of the different contents.

General considerations
Since attendance to the activities programmed in these subjects is mandatory, the absence of any of them must be justified. In order to be able to pass the subject, it is required a global attendance of at least 80% of the scheduled sessions and obtain the minimum qualification set for each module.
It will be considered that a student obtains the Non-Appraising Qualification when he has attended less than 20% of the scheduled sessions.
Students who do not obtain the minimum qualification required to be able to pass each of the modules of the integrated laboratory will not pass the subject. In this case, the final maximum grade of the subject will be 3.5.
From the second enrollment, repeat students will only have to evaluate the specific modules that have not been exceeded.
This exemption will be maintained for a period of three additional license enrollments.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Basic Chemistry. Question solution	15	1	0.04	1, 3, 4, 8, 7
Basic instrumental technics. Question answers	22	1	0.04	1, 3, 4, 8, 5, 6
Cellular biology. Question resolutions	22	0.25	0.01	1, 3, 2, 4, 5
Mathematics	18	3	0.12	1, 3, 4
Physics	23	2	0.08	1, 3, 4, 5

Bibliography

The bibliography and the web links are indicated in the protocols of practices that will be found on the virtual campus or, as the case may be, in the Teaching Guide of the corresponding theory subject.
Web links:
Available in Moodle for the subject

Programming of the subject
You need to consult the Faculty website and the Moodle website of the subject