Universitat Autònoma de Barcelona

2022/2023

Integrated Laboratory Class 3

Code: 100884
ECTS Credits: 3

Degree	Type	Year	Semester
2500252 Biochemistry	OB	2	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

Prerequisites

You have to be attending simultaneously or have taken the theory subjects corresponding to the practices contents of the subject which are taught during the same semester.

In order to be able to attend the practices, the student must justify having passed the biosafety and security tests that ara available in the Virtual Campus and be knowledgeable and accept the rules of operation of the laboratories of the Faculty of Biosciences. The test should be answered in the corresponding space of the Virtual Campus, and the required information to be consulted is in the space of communication of the Degree in Biochemistry.

Students are advised to review the theoretical contents on which this subject is based on.

Objectives and Contextualisation

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

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

The contents are organized in an increasing level of complexity which are associated to the students' needs and to the acquisition of the theoretical contents.

During the Integrated Laboratory III the student acquires practical skills in the next contents:

- Genetics

- Biostatistics

- Biochemistry II

- Plant Physiology

- Advanced Techniques

- Chemistry and Protein Engineering

- Scientific Documentation

The practices in the laboratory focus on the learning of basic techniques specific to each field and on the basis to work in the laboratory.

Competences

- Act with ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.
- 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.
- Design experiments and understand the limitations of experimental approaches.
- Interpret experimental results and identify consistent and inconsistent elements.
- Manage bibliographies and interpret the information in the main biological databases, and also know how to use basic ICT tools.
- Process cells and tissues to obtain purified sub-cellular organelle preparations, and characterise them biochemically and structurally.
- Take account of social, economic and environmental impacts when operating within one's own area of knowledge.
- Take sex- or gender-based inequalities into consideration when operating within one's own area of knowledge.
- Think in an integrated manner and approach problems from different perspectives.

Learning Outcomes

1. Act with ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.
2. Apply the methodology of cellular subfractionation.
3. Assess experimental data in relation to the values published in the scientific literature.
4. Collaborate with other work colleagues.
5. Describe strategies for purifying complex mixture biomolecules.
6. Design experiments and understand the limitations of experimental approaches.
7. Determine the parameters for assessing cellular subfractionation.
8. Explain the fundamental theory behind microscopy and centrifuging techniques, and the instrumentation used.
9. Interpret experimental results and identify consistent and inconsistent elements.
10. Monitor and interpret experiment protocols from a critical perspective.
11. Take account of social, economic and environmental impacts when operating within one's own area of knowledge.
12. Take sex- or gender-based inequalities into consideration when operating within one's own area of knowledge.
13. Think in an integrated manner and approach problems from different perspectives.
14. Use the appropriate methodology for studying the different types of biological samples.
15. Use the basic techniques for analysing enzyme activity.
16. Use the basic techniques for handling and analysing proteins and nucleic acids.
17. Use the basic techniques for studying biomolecules in a chemistry laboratory.
18. Use the different ICT tools to ascertain the properties and structures of proteins.
19. Use the established methods for eliminating the different types of waste products from a biochemistry and molecular biology laboratory.

Content

Genetic Module

4 sessions of 3 hours:

1-Introduction to the biology and morphology of Drosophila

2-Development of a three-point genetic map

3-Observation of chromosomes and mutations (mutation and somatic recombination, chromosomal alterations, chromosomal inversions)

4-Genetic variability: blood groups (computer classroom)

Biostatistics module

2 sessions of 2 hours:

1. Descriptive statistics

2. Test of hypothesis (t and proportions) for one and two Samples (media comparisons)

Module. Plant Physiology

Session 1: Water potential determination and plasmolysis observation in plant tissues

Session 2: Study of photosynthesis in aquatic plants and in isolated spinach chloroplasts

Module of Biochemistry II

3 sessions of 4 hours:

1.Extraction, analysis and identification of lipids.

2.Determination of the concentration of ethanol in alcoholic solutions

3. Determination of the activity of pyruvate kinase in liver and rat muscle

Modules of Advanced Techniques and Chemistry and Protein Engineering

2 sessions of 4 hours (Advanced Techniques) + 3 sessions of 4 hours (Chemistry and Protein Engineering):

Titration of the tyrosine residues of a protein.

-Protein proteolysis and chemical fragmentation

-Study of the conformational stability of proteins

-Study of conformational changes in prion protein

-Electrophoresis in polyacrylamide gels-SDS.

Analysis of macromolecular structures of proteins and nucleic acids using an Electronic Microscope

Module of Scientific Documentation

2 sessions of 2 hours

1.- Techniques to search for scientific information in electronic sources: useful reference sources in biochemistry

2.- Database interrogation languages in the search and retrieval of speci

Methodology

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

Students will have Handbook of Practices available for each Module before the start of the practical sessions and, if it is necessary, a questionnaire will be at their disposal on the Moodle webpage.

In each practical session it is mandatory that the student brings: his own labcoat, laboratory glasses and the Practices Manual. You also have to bring a notebook, where each student will write down the observations made and a permanent marker.

For the performance of the practices the students will work in pairs under the supervision of the responsible professor. At the beginning of each session the teacher will make a brief theoretical explanation of the content of the practice and the experiments to be carried out by the students.

In order to achieve good performance and acquire the competencies corresponding to this subject, it is essential that the student make a previous comprehensive reading of the Practices Manual, familiarizing with the practices that will be carried out in each session as well as with the methodology that must be applied in each case.

In order to acquire the specific competences of the subject, attendance to the practical classes is mandatory. In the event that a student for a justified and unpredictable cause does not attend a session / practical sessions, he must inform the professor responsible for the subject and submit the corresponding justification as soon as possible. It is understood as justified reasons for health problems (the corresponding medical justification must be attached) or serious personal problems

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.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Practical classes in the laboratory	50	2	2, 5, 7, 8, 19, 14, 18, 15, 17, 16
Type: Supervised			
Tutorials	2.5	0.1	1, 12, 11, 3, 10, 6, 9
Type: Autonomous			
Completion of work and questionnaires	12.5	0.5	3, 4, 10, 6, 9, 13
Study	5	0.2	3, 4, 10, 6, 9, 13

Assessment

Attendance to practical sessions is mandatory. Students missing more than 20% of programmed sessions will be graded as "No Avaluable"

The weight of the modules in the 90% of the qulification corresponding to Elaboration of qustionnaires, memories and tests is as follows:

Genetic: 19.5%

Bioestadístics: 6.5%

Vegetal Physiology: 9.8%

Cientific Documentation: 2.2%

Biochemistry II :19.5%

Advanced Techniques: 13%

Chemistry and Protein Enginnering: 19.5%

Genetic Module

A questionnaire will be carried out and evaluated at the end of each session. The note of the Genetic Module will be the average of the obtained in the 4 sessions.

Biostatistics module

A test will be performed and evaluated on the computer at the end of each session. The note of the Bio-Statistics Module will be the average of the obtained in the 2 sessions.

Module. Plant Physiology: A final individual written test will be done on the last day of the practical course and it will account for 80% of the mark. The practice notebook will be carried out in groups and will account the remaining 20% of the mark. The notebook will be delivered via Virtual Campus one week after the end of the practical course.

Scientific Documentation Module

The evaluation contemplates the following concepts:

- General follow-up of the module (20%): it includes the attendance to th

- Individual exercise of knowledge (80%): the students will have to realize

Modules of Biochemistry II, Advanced Techniques and Chemistry and Protein Engineering

The student's attitude in the laboratory will be evaluated, punctuality, wearing appropriate material such as a labcoat, protective goggles and practice guides, previously worked at home for the student, as well as his work in the laboratory. Atthe end, the professor will give a questionnaire that has to be answered outside the laboratory. The evaluation of the attitude will mean 25% of the module's qualification, and the evaluation of the presented questionnaire the other 75% of the total of the module's mark.

General considerations

Students who do not obtain the minimum qualification required to be able to pass each of the modules of the integrated laboratory (3.5), will not pass the subject. In this case, the final maximum grade of the subject will be 3.5.

In the case that the Integrated Laboratory is differentiated in modules, from the second enrollment, the repeating students will only have to evaluate the specific modules in which they have not been succeeded.

This exemption will be maintained for a period of threeadditionalenrolments.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Elaboration of questionnaires, memories and tests	10	5	0.2	1, 12, 11, 2, 3, 4, 10, 5, 7, 6, 8, 9, 13, 19, 14, 18, 15, 17, 16
Monitoring of the work at the laboratory	90	0	0	3, 4, 10, 6, 9, 13

Bibliography

In most modules the bibliography and web links are indicated in the practice protocols or in the Teaching Guide of the corresponding theory subject.

For the case of the Scientific Documentation module:

ABADAL, E.; CODINA, Ll. Bases de datos documentales: características, funciones y método. Madrid: Síntesis, 2005.

ALEIXANDRE, R. "Fuentes de información en ciencias de la salud en Internet" [En línia]. Panace@, 2011, vol. 11, núm. 33. [Consulta: 11-07-2014]. Disponible a: http://www.medtrad.org/panacea/IndiceGeneral/n33-Ponencias-Aleiandre.pdf

CASTILLO, L. "Tema 3: fuentes y recursos de referencia" [En línia]. [Consulta: 09-07-2014]. Disponible a: http://www.uv.es/macas/SR3.pdf

CORDÓN, J.A, et al. Nuevas fuentes de información: información y búsqueda documental en el contexto de la web 2.0. Madrid: Pirámide, 2010.

Fuentes de información biomédica [En línia]. Cedimcat. [Consulta: 09-07-2014]. Disponible a: http://www.cedimcat.info/html/es/dir2471/doc26734.html

GALLEGO, J.; JUNCA, M. "Fuentes de información en ciencias sociales y humanidades, ciencias de la salud y ciencia y tecnología" [En línia]. Edukanda: recursos informativos en red. 2010, 17 de juny. [Consulta: 06-07-2014]. Disponible a: http://www.edukanda.es/mediatecaweb/data/swf/633.swf

HERNANDEZ-PEREZ, T.; GARCIA-MORENO, M.A. "Datos abiertos y repositorios de datos: nuevo reto para los bibliotecarios" [En línia]. El profesional de la informacion, 2013, v. 22, n. 3. [Consulta: 09-07-2014]. Disponible a: http://eprints.ucm.es/22025/

JUNCA, M. "Análisis de contenido: resumen e indización" [En línia]. Edukanda: recursos informativos en red. 2010, 16 dejuny. [Consulta: 06-07-2014]. Disponible a: http://www.edukanda.es/mediatecaweb/data/swf/592.swf

JUNCA, M. "Sistemas de clasificación documentales" [En línia]. Edukanda: recursos informativos en red. 2010, 16 de juny. [Consulta: 06-07-2014]. Disponible a: http://www.edukanda.es/mediatecaweb/data/swf/594.swf

TORRES RAMIREZ, I. Las fuentes de información. Estudios teórico-prácticos. Madrid: Síntesis,

Software

FoldIt

https://fold.it

G-Stat 2.0: Statistic analysis software

G-Stat