Universitat Autònoma de Barcelona

2018/2019

Laboratory II

Code: 101946
ECTS Credits: 3

Degree	Type	Year	Semester
2500890 Genetics	OB	1	2

Contact

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Use of languages

Principal working language: spanish (spa)
Some groups entirely in English: No
Some groups entirely in Catalan: Yes
Some groups entirely in Spanish: Yes

Prerequisites

Students enrolled in this course for the first time should be enrolled simultaneously in the subjects: Animal and Plant Biology, Biochemistry and Animal Physiology. This course develops practical aspects of theoretical concepts studied in these courses.

Student must have passed the laboratory safety and biosecurity test, and be knowledgeable and accept the laboratories operating regulations of the Biosciences School. The test and the information needed to properly answer its questions can be found in the "Campus Virtual" area (http://cv.uab.cat)

Students should review the theoretical contents of each laboratory unit.

All the laboratory units are mandatory.

Students who do not wear a laboratory coat cannot enter the laboratory.

Objectives and Contextualisation

The Integrated Laboratory II is the second laboratory course of a set of six that are distributed throughout six semesters of the first three years of the Genetics Degree.
These laboratory courses aim to provide a solid basis for experimental procedures, techniques and skills in genetics and related sciences.
The laboratory practices reinforce the theoretical concepts acquired in the theory classes, allowing to fully understanding the essential dialogue between conceptual and experimentation that comprise the genetics science.
The Integrated Laboratory II has as its training objectives the acquisition of experimental competencies in 3 specific modules:

- Animal and Plant Biology
- Biochemistry
- Animal Physiology

Animal and Plant Biology

Botany

To learn how to recognize cyanobacteria, photosynthetic aquatic eukaryotes, higher plants and fungi through their morphological characteristics.

To identify the fundamental structures and their relevance through their most common representatives, in order to understand the evolution and morphological diversity.

Plant physiology

To determine the Water Potential (Ψ) of a fresh vegetable tissue analysing the weight variations produced when placing it in media with different concentrations.
To study the Hill Reaction in a suspension of isolated chloroplasts, using DPIP as an artificial electron acceptor. The inhibition of water photolysis at the level of Photosystem II using a synthetic inhibitor, DCMU (a product known commercially as Diuron ® and used as an herbicide in agriculture) is simultaneously determined.
Observation of the plasmolysis phenomenon in epidermal cells of onion bulb and calculation of its Allium strain osmotic potential.

Zoology

To identify the anatomical and morphological characteristics of different animal groups. Taxonomical identification and location ofthe different animal species observed. To learn how to use dichotomous keys for animal determination.

Biochemistry

Be able to apply spectrophotometric techniques for the quantification and analysis of biomolecules. Be able to use liquid chromatography, as one of the most common tools in the analysis and separation of biomolecules, interpreting the obtained results.
Be able to separate and analyze polypeptides by denaturing electrophoresis on polyacrylamide gel (PAGE-SDS).
Be able to perform simple tests to analyze the catalytic capacity of enzymes.

Animal Physiology

This module is complementary to the theoretical concepts studied in the course "Animal Physiology". The objectives of these laboratory practices are that the students:
Acquire and consolidate basic notions of behaviour in an experimental biomedical laboratory.
Become familiar with some of the experimental techniques that have allowed the development of Physiology as a science, which are the basis of some of the principles addressed in the theoretical classes and seminars of the course "Animal Physiology."
Interpret and critically evaluate laboratory results relative to real or induced situations from a physiological perspective.
Recognize a professional path in Physiology.
Develop critical, organization and synthesis abilities.

Skills

- Apply scientific method to problem solving.
- Be able to communicate effectively, orally and in writing.
- Be able to organise and plan.
- Describe and identify the structural and functional characteristics of nucleic acids and proteins including their different organisational levels.
- Describe the diversity of living beings and interpret it evolutionally.
- Design experiments and interpret the results.
- Know and interpret the metabolic and physiological bases of organisms.
- Recognise and structurally and functionally describe the different levels of biological organisation, from macromolecules to ecosystems.

- Use and manage bibliographic information or computer or Internet resources in the field of study, in ones own languages and in English.
- Work individually and in teams.

Learning outcomes

1. Apply biochemical and genetic engineering techniques to identify and characterise nucleic acids and proteins.
2. Apply enzymatic and biomolecule analysis techniques.
3. Apply scientific method to problem solving.
4. Apply suitable methodologies to classify animal and plant specimens.
5. Apply the methodologies to identify animal and plant specimens.
6. Be able to communicate effectively, orally and in writing.
7. Be able to organise and plan.
8. Design experiments and interpret the results.
9. Determine and interpret physiological parameters in animal and plants.
10. Determine environmental variables of ecosystems.
11. Obtain, handle, preserve and observe animal and plant specimens.
12. Use and manage bibliographic information or computer or Internet resources in the field of study, in ones own languages and in English.
13. Use techniques for the detection, separation and purification of biomolecules.
14. Work individually and in teams.

Content

Animal and Plant Biology module

Botany
Practice 1: Cyanobacteria and Eukaryotic Aquatic Photosynthesis
Practice 2: Spermatophytes (Angiosperms)
Practice 3: Fungi and Lichens.

Plant Physiology
Practice 1: Determination of the water potential in vegetables
Practice 2: Study of the Hill reaction in isolated chloroplasts and their inhibition by DCMU.
Practice 3: Osmotic potential assess. Method of incipient plasmolysis

Zoology
Pr. 1. Sponges, Cnidarians and Flatworms
Pr. 2. Mollusks and Annelíds
Pr. 3. Arthropods
Pr. 4. Chordata

Biochemistry module

Practice 1: Determination of the concentration of glucose by a colorimetric method. Absorption spectrum of a glucose derived compound. Preparation of buffers.
Practice 2: Chromatography of gel filtration: Separation of hemoglobin from vitamin B12 and dextrase blue. Separation of proteins by PAGE-SDS electrophoresis.
Practice 3: Enzymatic activity of acid phosphatase. Determination of initial speeds to calculate kinetic parameters.

Animal Physiology module

1. Nervous action potential - LabAXON (computer simulation)

    Place: Computer room
    Estimated duration: 3h

Contents: Study of neuronal action potential characteristics with a computer simulation.
Definition and calculation of neuronal activity parameters.

2. Spirometry - Performance and interpretation of a functional respiratory test (spirometry)

Place: Laboratory of practices (to be determined)
Estimated duration: 3h
Contents: Making and interpretation of a simple spirometry.
Calculation of parameters related to the respiratory function.

3. Enzymatic digestion - Determination of enzymatic activity of human salivary amylase

Place: Laboratory of practices (to be determined)
Estimated duration: 3h
Contents: Obtaining human salivary amylase.
Evaluation of the enzymatic activity in different experimental conditions: Type of substrate, temperature and pH.

4. Comparative anatomy: Dissection of a rat

Place: Laboratory of practices (to be determined)
Estimated duration: 3h
Contents: Making a necropsia (partially regulated) of a laboratory rat.
Recognition of the basic anatomical organization of a mammal.
Recognition of the main organs.
Making basic anatomical-functional relationships

Methodology

The subject is taught in small groups of students (maximum 20 per session) in the laboratory. Students have a manual or practice guide for each Module. It is necessary to read the corresponding part of each session carefully before starting the practice to obtain the maximum advantage. Students will have to produce the results obtained.

Module - Animal and Plant Biology

Botany

In each practical session it is mandatory for the student to bring their own dressing gown and the practice guides and the description sheets, both will be available on the Virtual Campus or when indicated by the teaching staff. You also have to bring a notebook, where each student will write down the observations made. For the realization of the practices, the students will workalone or in pairs and under the supervision of the professor. At the beginning of each session the teacher will make a brief theoretical explanation of the content of the practice and of the experiences and observations to be carried out by the students.

Plant Physiology

The student must prepare previously each practice session. You need to dedicate approximately 1 hour to review the theoretical concepts, the foundation of the practice, the methodology to follow and the objectives that you want to achieve.

After the preparation of the practice, another approximate time will be necessary to prepare the results obtained in each practice and answer the questions in the practice guide.

Zoology

Module - Biochemistry

Autonomous process based on guided observation and experimentation. Students will have to elaborate the results obtained and / or answer the questions posed in the practice manual.

Module - Animal Physiology

The programmed training activities include time of directed learning and time of self-learning.

Laboratory sessions / computer classroom: Classroom sessions to which students develop protocols and experimental situations contained in the practice scripts. These sessions are always carried out with a current teacher that explains the work to do and supervise the tasks that must be carried out in the laboratory / computer room.

Tutorials: Time of discussion and resolution of doubts / problems that appear during the time of directed learning or the one of autoaprendizaje. They will be done individually or in small groups depending on the requirements and the areas of the issues to be discussed. This activity will be programmed at the request of the students themselves.

Self-learning: Autonomous training activities (individual or in group) in which the student works and deepens both the content of the practical scripts and the experimental data generated in the computer lab / classroom. These activities include the reading and understanding of the scripts of practices before their development laboratory as well as the preparation of the corresponding questionnaires.

Activities

Title	Hours	ECTS	Learning outcomes
Type: Directed			
Laboratory (Bio Animal and Vegetal: Bot 9, FV 9 and Zoo 10; BQ 10,5; FA 12)	50.5	2.02	3, 5, 4, 2, 9, 10, 8, 11, 6, 7, 14, 12, 13
Type: Supervised			
Individual tutorials	1	0.04	
Type: Autonomous			
Lab booknote	3	0.12	3, 5, 4, 2, 9, 10, 8, 11, 6, 7, 14, 12, 13
Study	14.5	0.58	

Evaluation

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

Module Animal and Plant Biology

Botany

The use of practices will be evaluated through a small test at the end of the laboratory session (15%), and an exam (85%) consisting of two parts: Visum, and Description of a fruit / fruit or corm modification.

Plant Physiology

For the assessment of the student, the practical guideline is taken into account, where all the necessary calculations and graphic representations will be required, as well as the answers to the questions that are

posed. Attitude and punctuality are also valued. Month by month, at the end of each group of practices, the teacher will do a short question of short questions about the concepts worked during the practices. The note will be numerical and will count as a note from the part of FV.

Zoology

At the end of each practice the student will have to answer a questionnaire to evaluate that he has achieved the knowledge and the specific competences of each practice. The note of this module will be calculated based on the average mark of the questionnaires.

Biochemistry module

The student's attitude in the laboratory will be evaluated, punctuality, wearing the appropriate material such as a dressing gown, goggles and practical guides, previously worked at home for the student, as well as his work in the laboratory. The student on the day the teacher will give a questionnaire that will respond outside the laboratory. The evaluation of the attitude will represent 25% of the mark, and the evaluation of its degree by using the questionnaire presented the other 75% of the total of the module's note.

Animal PhysiologyModule

The note for this module depends on:

1 - Assistance.

Attendance to the practices is mandatory and is considered a requirement to be evaluated.

2 - Laboratory work.

Scripts and questionnaires to be completed during the practices and that will be submitted for evaluation, following the instructions of the teacher.

Individual realization

40% of the final mark.

3 - Examination of practices

Examination of short questions to be done at the end of the practical sessions.

60% of the final grade.

You must obtain all the practices with a rating equal to or greater than5.0 to pass this module. Practices with a qualification of less than 5.0 recovered in a final exam of practices. There is no possibility of raising the final grade obtained in this module.

To pass the course, it is necessary to first approve each module with a note = 5.

Students who do not pass the different modules of the subject will be able to recover them on the scheduled date for the recovery evaluation of the subject. Students who have not passed one of the modules after the recovery evaluation will not approve the subject. In spite of this, it will not be necessary for a repeating student to carry out the teaching activities or the evaluations of that module passed after the second enrollment. Repeaters will only have to be evaluated for the specific module that has not been exceeded. This exemption will be maintained for a period of three additional license plates.

The final grade is the weighted average of the notes of each module, the Animal and Vegetable Biology module weighs 0.5 and that of Biochemistry and Animal Physiology ¼ each.

To be eligible for the retake process, the student should have been previously evaluated in a set of activities equaling at least two thirds of the final score of the module.

Evaluation activities

Title	Weighting	Hours	ECTS	Learning outcomes
Biochemistry (Continuous assessment of the results worked)	20%	1.2	0.05	3, 2, 9, 8, 6, 7, 14, 12, 13
Module Animal Physiology (continuous assesment of the results)	20%	1.2	0.05	3, 5, 1, 2, 9, 8, 11, 6, 7, 14, 12, 13
Module Botanics (continuous assesment of the results)	20%	1.2	0.05	3, 5, 4, 1, 2, 9, 10, 8, 11, 6, 7, 14, 12, 13
Module Plant Physiology (Continuous evaluation of the results worked)	20%	1.2	0.05	3, 5, 4, 1, 2, 9, 10, 8, 11, 6, 7, 14, 12, 13
Module Zoology (Continuous evaluation of the results worked)	20%	1.2	0.05	3, 5, 4, 1, 2, 9, 10, 8, 11, 6, 7, 14, 12, 13

Bibliography

Module Animal and Vegetal Biology

Guide at Campus Virtual

Botanics

1. LLIMONA, X. (ed.) 1985. Plantes inferiors. Història Natural dels Països Catalans. Vol. 4. Enciclopèdia Catalana. Barcelona.

2. LLIMONA, X. (ed.) 1991. Fongs i líquens. Història Natural dels Països Catalans. Vol. 5. Enciclopèdia Catalana. Barcelona.

3. IZCO, J. et al. 2004. Botánica. McGraw-Hill-Interamericana. Madrid.

4. STRASBURGER, E. et al. 2004. Tratado de Botànica. 9ª edic. Omega. Barcelona.

5. Herbari Virtual UAB. http://blogs.uab.cat/herbari/

Vegetal Physiology

BARCELÓ, J.; NICOLÁS, G.; SABATER, B.; SÁNCHEZ, R. 2003 Fisiología Vegetal. Ed. Pirámide. Madrid.

Fisiología Vegetal, J. Barceló et al., Ed. Piràmide, Madrid 2005

Plant Physiology, L. Taiz y E. Zeiger, 4th edition, Sinauer, Sunderland, MA (USA, 2006 http://4eplantphys.net/

Zoology

BARNES (2009). Zoología de los Invertebrados. Ed. MacGraw-Hill. Interamericana. Setena edició.

MUNILLA,T. (1992). Prácticas de Zoología General. I. Invertebrados no Artrópodos. Ed. Oiokos-Tau.

BARRIENTOS, J.A. (2004) Curso Práctico de Entomología. Manuals de la Universitat Autònoma de Barcelona. Asociación Española de Entomología, CIBIO-Centro Iberoamericano de Biodiversidad & Universitat Autònoma de Barcelona.

Module Biochemistry

Guide at Campus Virtual.

Module Animal Physioology

Guide at Campus Virtual.

The guides will include the references that are considered appropriate as well as a correspondence to the theoretical subjects, treated in the subject "Animal Physiology", that are considered to be relevant for the correct follow-up and understanding of each one of the practices.