

Laboratory I

Code: 101947
ECTS Credits: 3

Degree	Type	Year	Semester
2500890 Genetics	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: No
Some groups entirely in Spanish: No

Teachers

Isidre Gibert Gonzalez
Laura Tusell Padros

Prerequisites

- Students must have passed or are currently taking the theoretical courses corresponding to the laboratory contents.
- Student must have passed the laboratory safety and biosecurity test, and be knowledgeable and accept the laboratories operating regulations at 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 I is the first 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 theoretical classes, allowing to fully understanding the essential dialogue between theory and experimentation that comprise the genetics science.

The Integrated Laboratory I has as its training objectives the acquisition of experimental competencies in 3 specific modules:

- Cell Biology
- Histology
- Microbiology

Cell Biology

1. To apply microscopic and cell culture techniques to recognize and describe structures and processes at the level of cell.

Histology

1. To know how to apply basic histological techniques for microscopic diagnosis.
2. Identify at the microscope different levels of animal tissues and their cellular and extracellular components.

Microbiology

1. To apply the general techniques of microorganisms culture, observation, identification and conservation.

Competences

- Apply knowledge of theory to practice.
- Describe the diversity of living beings and interpret it evolutionally.
- Develop self-directed learning.
- 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.
- Understand and describe the structure, morphology and dynamics of the eukaryotic chromosome during the cell cycle and meiosis.
- Work individually and in teams.

Learning Outcomes

1. Apply general microorganism culture, observation, identification and conservation techniques.
2. Apply knowledge of theory to practice.
3. Apply microscopic and microscopic image diagnosis techniques.
4. Apply suitable methodologies to identify and classify microorganisms.
5. Determine and interpret parameters of the populational growth of microorganisms.
6. Develop self-directed learning.
7. Isolate and prepare cell and tissue cultures of multicellular organisms.
8. Prepare cultures of human lymphocytes.
9. Work individually and in teams.

Content

Cell Biology module

Practice 1: Cellular diversity under the conventional optical microscope: The plant cell.

Practice 2: Cellular diversity under the conventional optical microscope: The animal cell.

Practice 3: Introduction to the electronic microscope.

Practice 4: Transport through the membrane: osmosis and diffusion.

Practice 5: Mitotic cell division.

Practice 6: Meiotic cell division.

Practice 7: Cell fragmentation and separation of organelles

Practice 8: Cultures: Basic techniques of cell cultures (counting and viability).

Histology module

Practice 1: Initiation to the histological techniques for processing animal material. Microscopic identification of epithelial tissues.

Practice 2: Microscopic identification of connective and adipose tissues.

Practice 3: Elaboration and staining of blood smears of sheep. Microscopic identification of elements of blood and cartilage and bone tissues.

Practice 4: Microscopic identification of muscular and nervous tissues.

Microbiology module

- General Techniques

Module 1 Basic equipment

Module 2 Sterilization techniques

Module 3 Culture media

General Procedures

Module 4 Counting microorganisms

Module 5 Isolation and conservation of microorganisms

Module 6 Observation of microorganisms: stains

Module 7 Observation of microorganisms: motility

Module 8 Identification of microorganisms

Module 9 Ubiquity and microbial diversity

Module 10 Bacterial growth curve

Module 11 Antibiotic Susceptibility Testing: diffusion method

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.

The activities follow an autonomous process based on guided observation and experimentation. Students will have to elaborate the results obtained and / or respond to the questions posed in the scripts or the memoirs.

Once the teacher has begun the explanation of the practice, the entrance of no more student in the classroom will be allowed. The late student may retrieve the practice another day, either with a group of their own Degree or another, as long as the group is not full. In case all the remaining groups are full or the practice is no longer taught, the student will not be able to recover the practice and will have a lack of assistance.

If a student, due to justified cause, has not been able to attend a practical session, he must contact the person in charge of the subject and present the corresponding document. In this case, a new day will be assigned to recover the practice. In case the practice is no longer taught and the student can not recover it, it will not be counted as a lack of assistance.

Note: Health problems are considered justified by reason (the corresponding medical justification must be presented) 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			
Laboratory (Cell Biol 16h, Hist 14h, Microbiology 15h)	45	1.8	2, 4, 1, 3, 7, 6, 5, 8, 9
Type: Supervised			
Individual tutorials	1	0.04	2, 4, 1, 3, 7, 6, 5, 8, 9
Type: Autonomous			
Laboratory notebook	4	0.16	2, 6, 9
Study	19	0.76	2, 4, 1, 3, 7, 6, 5, 8, 9

Assessment

Cell Biology Module: At the end of each practice the student will have to complete a questionnaire and / or card in order to evaluate if they have assimilated the specific objectives that have been worked on. Therefore, it is important for the student to enter in the laboratory book all the observations and calculations that are necessary in each session.

The practical note of the Cell Biology module will be calculated from the average note of the 8 questionnaires and / or practice sheets. If you do not attend any of the sessions without just cause, the note will be corrected as follows:

8 sessions → Average note of the tokens

7 sessions → Reduction to 75% of the average mark of questionnaires / files

6 sessions → Reduction to 50% of the average mark of questionnaires / files

≤5 sessions → 0

Students who have obtained an average grade of less than 5 (out of 10) will be able to take a recovery exam on the scheduled date at the end of the semester. The recovery of module 1 (Cell Biology) will consist of a written exam where the concepts worked in the practical sessions will be evaluated.

Histology module: The evaluation system is organized in the following sections:

1) Assessment of the contents at the end of each practice (50% of the mark). This test consists of a questionnaire and the recognition of microscopic structures. The note in this section is obtained from the average of the grades obtained in each practice. If you do not attend any of the sessions, without just cause, the corresponding note of the practice will be considered as zero.

2) Global microscopic diagnostic test (50% of the note).

In order to be able to gauge the notes obtained in each section, it will be essential that the student obtains a grade equal to or greater than 4 points (out of 10) in each of them. Students who have obtained a final grade of less than 5 (out of 10) will have to take a recovery test, which will consist of a microscopic diagnostic test and a questionnaire.

Microbiology module: There will be two types of evaluation:

1. Continuous assessment of group work. The practical ability of each group of students will be evaluated daily taking into account the results obtained in each session.

2. Individual assessment of the contents: a written essay will be performed on the last day of practice consisting of several test questions.

These tests will have a weight of 3 and 7 points, over 10, respectively.

To approve the Integrated Laboratory, it is necessary to have approved each one of the three modules with a mark ≥ 5 . The final grade will be the average of the notes of each module

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 course or module. Thus, the student will be graded as "No Avaluable" if the weighthin of all conducted evaluation activities is less than 67% of the final score.

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

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Cell Biology. Individual continuous assessment throughout the course	33.3%	1.42	0.06	2, 3, 7, 6, 8, 9

Final test (individual assessment)	100%	2	0.08	2, 4, 1, 3, 7, 6, 5, 8, 9
Histology. Individual continuous assessment throughout the course	33.3%	1.25	0.05	2, 1, 3, 7, 6, 8, 9
Microbiology. Individual continuous assessment throughout the course	33.3%	1.33	0.05	2, 4, 1, 3, 7, 6, 5, 8, 9

Bibliography

Cell Biology module

The practice guide can be downloaded from the Virtual Campus.

Histology module

The Dossier of activities can be downloaded from the Virtual Campus

- Boya, J.: Atlas de Histología y Organografía microscópica (ed. Panamericana).
- Eroschenko, V.P.: Di Fiore's atlas of Histology (ed. Lea and Febiger).
- Gartner, L.P. y Hiatt, J.L.: Atlas color de Histología (ed. Panamericana).
- Kühnel, W.: Atlas color de Citología e Histología (ed. Panamericana).
- Stanley, L.E. y Magney, J.E.: Coloratlas Histología (ed. Mosby).
- Young, B. y Heath, J.W.: Histología funcional (Wheater) (ed. Churchill Livingstone).

Microbiology Module

The practice guide can be downloaded from the Virtual Campus

Recommended Bibliography

- Madigan, M., JM Martinko, K. Bender, D. Buckley, D Stahl. 2015. Brock Biología de los Microorganismos. 14a ed. Pearson Educación, S.A. ISBN:978-849035279

Willey, J, LM Sherwood, CJ Woolverton. 2008. Microbiología de Prescott, Harley y Klein. 7a ed. McGraw-Hill Interamericana de España S.L. ISBN: 978-8448168278

Web resources

- <https://www.semicrobiologia.org>
- http://ddm.semicrobiologia.org/sec/videos_didacticos.php
- <http://www.microbeworld.org/>
- <http://weblogs.madrimasd.org/microbiologia/>
- <http://microbewiki.kenyon.edu/index.php/MicrobeWiki>
- <http://serc.carleton.edu/microbelife/>
- <http://www.microbiologia.com.ar/>

Software

No specific software is needed.