



IDENTIFYING DATA

Biology: Basic laboratory techniques

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|---------------------|---|-----------------|------|------------|
| Subject | Biology: Basic laboratory techniques | | | |
| Code | V02G031V01108 | | | |
| Study programme | Grado en Biología | | | |
| Descriptors | ECTS Credits | Choose | Year | Quadmester |
| | 6 | Basic education | 1st | 2nd |
| Teaching language | Spanish Galician | | | |
| Department | | | | |
| Coordinator | Gil Martín, Emilio | | | |
| Lecturers | Barreal Modroño, M. Esther Combarro Combarro, María del Pilar Gallardo Medina, Mercedes Gallego Veigas, Pedro Pablo Gil Martín, Emilio González Orenge, Sara Lopez Patiño, Marcos Antonio Miguel Villegas, Encarnación de Míguez Miramontes, Jesús Manuel San Juan Serrano, María Fuencisla | | | |
| E-mail | egil@uvigo.es | | | |
| Web | | | | |
| General description | Experimental subject designed to reach specific skills of handling, extraction and processing of biological samples, as well as their morphological, structural, functional and analytical characterization in the laboratory. The acquisition of these scientific and technical specific competences will be achieved through the assimilation of scientific and technical knowledge and the development of instrumental routines of general application in experimental biology. Furthermore, they will also provide the students with essential skills (transversal competences), which are pivotal for understanding specific topics of subjects in subsequent courses. | | | |

Training and Learning Results

| | |
|------|--|
| Code | |
| A1 | Students should prove understanding and knowledge in this study field that starts in the Secondary Education and with a level that, even though it is supported in advanced books, also includes some aspects that involve knowledge from the vanguard of the study field. |
| A5 | Students should develop the necessary learning skills to undertake further studies with a high degree of autonomy. |
| B1 | Developing autonomous learning by identifying their own training need and organizing and planning tasks and time. |
| B3 | Apply the knowledge acquired in the degree and use the scientific-technical instrumentation and CIT in contexts of Biology and/or related to the professional practice. |
| C1 | Solve problems by applying the scientific method, the concepts and terminology specific to biology, mathematical models and statistical and computer tools. |
| C3 | Perform and interpret molecular, physicochemical and biological analyses, including samples of human origin. Conduct assays and functional tests under normal and abnormal conditions. |
| C4 | Isolate, identify and growth microorganisms, cells, tissues and organs, making easier their study and the assessment of their metabolic activity. |
| C10 | Identify biological and biotechnological processes and their potential applications, in particular in health, agri-food and environmental fields. |
| D3 | Commitment to sustainability and the environment. Equal, sensible and efficient use of resources. |
| D4 | Collaborate and work in teams or multidisciplinary groups, promote negotiation skills and the ability to reach agreements. |
| D5 | Communicate effectively and appropriately, including the use of computer tools and English. |

Expected results from this subject

| Expected results from this subject | Training and Learning Results | | | |
|---|-------------------------------|----|-----|----|
| Understanding the basic techniques for the collection, cultivation and breeding of living beings. | A1 | B3 | C4 | D3 |
| Understanding the basic techniques for obtaining and processing biological samples. | A1 | B3 | C1 | D3 |
| | | | C10 | D4 |
| To know and handle the basic techniques for observation, identification and analysis of biological samples. | A1 | B3 | C1 | D4 |
| | A5 | | C3 | D5 |
| | | | C10 | |
| Applying knowledge of Basic Laboratory Techniques to isolate, identify, handle and analyze specimens and samples of biological origin, including virus, as well as to characterize their cellular and molecular constituents. | A1 | B1 | C1 | D3 |
| | A5 | B3 | C3 | D4 |
| | | | C10 | D5 |
| Analyzing the functioning of living beings and interpret vital parameters. | A1 | B1 | C1 | D4 |
| | A5 | B3 | C3 | |
| | | | C10 | |
| To know and handle the concepts, terminology and scientific-technical instrumentation related to Basic Laboratory Techniques. | A1 | B3 | C1 | D3 |
| | | | C3 | D4 |
| | | | | D5 |

Contents

| Topic | |
|---|--|
| MODULE I. TECHNIQUES FOR THE PROCESSING AND OBSERVATION OF BIOLOGICAL SAMPLES | <p>Unit 1. Fundamentals and types of optical microscopes and stereomicroscopy.</p> <p>Unit 2. Specimen fixation and inclusion.</p> <p>Unit 3. Fundamentals of microtomy. Types of microtomes and their handling.</p> <p>Unit 4. General staining techniques. Processing and observation of stained sections.</p> |
| MODULE II. EXPERIMENTATION WITH MICROORGANISMS | <p>Unit 1. Sterilization. Disinfection and asepsis.</p> <p>Unit 2. Elaboration of culture media.</p> <p>Unit 3. Culture of microorganisms and viruses.</p> <p>Unit 4. Biological risks.</p> |
| MODULE III. EXPERIMENTATION WITH PLANTS IN THE LABORATORY | <p>Unit 1. Germination.</p> <p>Unit 2. Plant cultivation.</p> <p>Unit 3. Analysis and interpretation of the results.</p> |
| MODULE IV. EXPERIMENTATION WITH ANIMALS IN THE LABORATORY | <p>Unit 1. Animals for research. Animal models and their basic characteristics.</p> <p>Unit 2. Legislation on experimentation with animals. Theoretical aspects about basic manipulation of living animals.</p> <p>Unit 3. Treatments administration and sampling in experimental animals.</p> |
| MODULE V: PROCESSING AND ANALYTICAL TECHNIQUES OF BIOLOGICAL SAMPLES | <p>Unit 1. Techniques for sample preparation.</p> <p>Unit 2. Techniques for sample separation I.</p> <p>Unit 3. Techniques for sample separation II.</p> <p>Unit 4. Techniques for sample analysis.</p> |

Planning

| | Class hours | Hours outside the classroom | Total hours |
|---|-------------|-----------------------------|-------------|
| Lecturing | 16 | 32 | 48 |
| Laboratory practical | 38 | 52 | 90 |
| Report of practices, practicum and external practices 0 | | 1 | 1 |
| Report of practices, practicum and external practices 0 | | 1 | 1 |
| Report of practices, practicum and external practices 0 | | 1 | 1 |
| Report of practices, practicum and external practices 0 | | 1 | 1 |
| Report of practices, practicum and external practices 0 | | 1 | 1 |
| Objective questions exam | 2 | 5 | 7 |

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

| Methodologies | |
|----------------------|--|
| Methodologies | Description |
| Lecturing | Teacher dissertation about the scientific concepts and technical guidelines needed for the acquisition of specific competences in manipulation, processing and analytical characterization of biological samples in the laboratory. The master sessions are complemented with individual and group activities to strengthen the more relevant learning objectives. Depending on the case, these activities may be carried out in the classroom or during the autonomous work time. All of them may be computed for evaluation. |
| Laboratory practical | Activities carried out in the laboratory. They involve the application to specific experimental goals of the knowledge and guidelines treated in the master sessions. In addition to the experimental work, laboratory practises include individual or group tasks aimed at promoting the acquisition of the specific and transversal competences of the subject. They can be performed either in the laboratory or as part of the student's autonomous work. Moreover, they will be computed for evaluation. |

Personalized assistance

| Methodologies | Description |
|----------------------|---|
| Lecturing | The master sessions will be dynamical discussions open to the active participation of students, and incorporate test and other examination modalities to check the learning progress of each student and thus advise, if necessary, personalized reinforcement actions. It also contemplates the possibility of monitoring autonomous work or solving doubts arising by e-mail. On the other hand, it is established a reserve of 6 h/week/professor for tutoring and management of requests and/or learning problems they are encountering. The timetable of these tutorials will be announced by the responsible (coordinator) in the initial conference (Introductory activities) of the subject, and will be also available online, both in Moovi and the website of the Faculty. |
| Laboratory practical | Teachers will provide individualized attention to each student during laboratory practises, providing the support they need for a correct understanding of the experimental objectives, the methodology required or the specific techniques to be carried out. Once the experimental procedures have been completed, each student or work-group will be supervised and will receive ad hoc feedback based on the results obtained. |

Assessment

| Description | | Qualification Training and Learning Results | | | | |
|---|---|---|--|--|--|--|
| Report of practices, practicum and external practices | CONTINUOUS ASSESSMENT MODULE I. The contents and skills acquired in the theoretical seminars and laboratory activities will be evaluated through the preparation of tests, which will be developed on the dates indicated in the four-month schedule. In addition, the systematic observation of students, their involvement, attitude and work quality will also be taken into account for evaluation. In case of not reaching a minimum score corresponding to 40%, the subject will be considered failed. The notes corresponding to the continuous evaluation will be made public by the staff within 15 days after the end of the teaching activity. | 15 | A1 B1 C1 D3 A5 B3 C3 D4 C4 D5 C10 | | | |
| Report of practices, practicum and external practices | CONTINUOUS ASSESSMENT MODULE II. The contents and skills acquired in the theoretical seminars and laboratory activities will be evaluated through the preparation of tests, which will be developed on the dates indicated in the four-month schedule. In addition, the systematic observation of students, their involvement, attitude and work quality will also be taken into account for evaluation. In case of not reaching a minimum score corresponding to 40%, the subject will be considered failed. The notes corresponding to the continuous evaluation will be made public by the staff within 15 days after the end of the teaching activity. | 15 | | | | |

| | | | |
|---|---|----|--|
| Report of practices, practicum and external practices | <p>CONTINUOUS ASSESSMENT</p> <p>MODULE III. The contents and skills acquired in the theoretical seminars and laboratory activities will be evaluated through the preparation of tests, which will be developed on the dates indicated in the four-month schedule. In addition, the systematic observation of students, their involvement, attitude and work quality will also be taken into account for evaluation.</p> <p>In case of not reaching a minimum score corresponding to 40%, the subject will be considered failed.</p> <p>The notes corresponding to the continuous evaluation will be made public by the staff within 15 days after the end of the teaching activity.</p> | 15 | |
| Report of practices, practicum and external practices | <p>CONTINUOUS ASSESSMENT</p> <p>MODULE IV. The contents and skills acquired in the theoretical seminars and laboratory activities will be evaluated through the preparation of tests, which will be developed on the dates indicated in the four-month schedule. In addition, the systematic observation of students, their involvement, attitude and work quality will also be taken into account for evaluation.</p> <p>In case of not reaching a minimum score corresponding to 40%, the subject will be considered failed.</p> <p>The notes corresponding to the continuous evaluation will be made public by the staff within 15 days after the end of the teaching activity.</p> | 5 | |
| Report of practices, practicum and external practices | <p>CONTINUOUS ASSESSMENT</p> <p>MODULE V. The contents and skills acquired in the theoretical seminars and laboratory activities will be evaluated through the preparation of tests, which will be developed on the dates indicated in the four-month schedule. In addition, the systematic observation of students, their involvement, attitude and work quality will also be taken into account for evaluation.</p> <p>In case of not reaching a minimum score corresponding to 40%, the subject will be considered failed.</p> <p>The notes corresponding to the continuous evaluation will be made public by the staff within 15 days after the end of the teaching activity.</p> | 20 | |
| Objective questions exam | <p>FINAL INTEGRATING TEST (FIT)</p> <p>The fundamental contents and aptitudes of the subject will be evaluated in an obligatory, written examination. By means of several types of questions and exercises, the degree to which each student, relating and integrating the theoretical and applied knowledge acquired in the different modules, is able solving a real experimental case, will be evaluated.</p> <p>If FIT's score does not reach the 40% of maximum, the subject will be considered suspended.</p> | 30 | A1 B1 C1 D3 A5 B3 C3 D4 C4 D5 C10 |

Other comments on the Evaluation

CONTINUOUS EVALUATION

The academic calendar for the different modules and experimental groups, as well as the presentation of the subject by the coordinator can be consulted on the website of the Faculty (<http://bioloxia.uvigo.es/en/teaching/timetables>). The official dates for the FIT of the different calls can also be consulted on the this website (<http://bioloxia.uvigo.es/en/teaching/exams>).

The continuous assessment itinerary requires the student to carry out **ALL** the learning and evaluation activities established in each experimental module. If this requirement is not reached, the student will be governed by the global assessment system (see below).

Attendance at all classrooms is **MANDATORY to APPROVE THE SUBJECT**, unless justified absence by reasons officially established; illness or federated sport competitions.

The student suspended in TBL will receive as final score the lowest obtained in CE or FIT.

In order to be evaluated as "Not presented", it will be necessary to have no evidence of attendance to the classes nor to have performed CE and FIT tests.

The different modules that have been approved, will be kept for the academic year.

FINAL EVALUATION

Students who renounce the continuous evaluation by the officially established procedure will be evaluated by means of a **SINGLE THEORETICAL-PRACTICAL TEST**, to be carried out on the dates established in the official calendar.

Sources of information

Basic Bibliography

Bancroft, J.D. & Gamble, M., **Bancroft's theory and practice of histological techniques, 7th ed**, Churchill Livingstone-Elsevier Corp, 2013

Madigan, M.T., Bender, K.S., Buckley, D.H., Sattley, W.M., Stahl, D.A., **Brock Biology of microorganisms, 16th ed**, Pearson Corp, 2022

Taiz, L. & Zeiger, E., **Plant Physiology, 6ª ed**, Sinauer Associates, Inc., Publishers, 2015

Zúñiga, J., Tur J.A., Milocco, S.N. & Piñero R., **Ciencia y tecnología en protección y experimentación animal**, McGraw-Hill Interamericana, 2001

Hofmann, A. & Clokie, S., **PWilson and Walker's Principles and Techniques of Biochemistry and Molecular Biology, 8th Edition**, Cambridge University Press, 2018

Complementary Bibliography

MÓDULO I,

Kiernan, J.A., **Histological and Histochemical Methods: Theory and Practice, 4th ed**, Scion Publishing, 2008

MÓDULO II,

Capuccino, J.G., Sherman, N., **Microbiology. A laboratory manual, 12ª edición**, Benjamin/Cummings Company Inc., 2019

MÓDULO III,

Azcón-Bieto, J. & Talón, M., **Fundamentos de Fisiología Vegetal, 2ª ed**, McGraw-Hill Interamericana, 2008

MÓDULO IV,

Rodríguez Martínez J., Hernández Lorente MD. & Costa Ruiz J., **Introducción a la experimentación con animales**, Servicio de Publicaciones de la Universidad de Murcia, 2001

MÓDULO V,

Pingoud A., Urbanke C., Hoggett J. & Jeltsch A., **Biochemical methods**, Wiley-VCH, 2002

Recommendations

Subjects that continue the syllabus

Biochemistry I/V02G031V01201

Biochemistry II/V02G031V01206

Subjects that are recommended to be taken simultaneously

Biology: Basic field techniques/V02G031V01109

Statistics: Biostatistics/V02G031V01107

Subjects that it is recommended to have taken before

Physics: Physics of biological processes/V02G031V01102

Mathematics: Mathematics applied to Biology/V02G031V01104

Chemistry: Chemistry applied to biology/V02G031V01105