Teaching guide

IDENTIFICATION DETAILS

Degree:	Biotechnology
Field of Knowledge:	Science
Faculty/School:	Bio-health Science
Course:	INTEGRATED LABORATORY II
Type:	Compulsory
ECTS credits:	6
Year:	2
Code:	2028
Teaching period:	Fourth semester
Area:	Work Placement
Module:	Experimental Methods in Biotechnology
Teaching type:	Classroom-based
Language:	English
Total number of student study hours:	150

Teaching staff	E-mail
Estela Perez Lago	e.perezlago.prof@ufv.es
Ana Bonnin Bioslada	a.bonnin@ufv.es
Olga Zafra Amoros	olga.zafra@profesores.ufv.es
Javier Sierra Isturiz	j.sierra.prof@ufv.es
Ester Martin Villar	ester.martin@ufv.es
Maria Inmaculada Calvo Sanchez	calvosanchezmaria@gmail.com
Barbara Rodriguez Colinas	barbara.rodriguez@profesores.ufv.es

SUBJECT DESCRIPTION

Lab 2 Course will be performed in the University labs and has been designed as real-life, professional experimental situations, from the different subjects taken during the 2nd year.
The course is intended to provide the students not only with the basic laboratory skills needed in a biotechnology or bioscience lab but also to develop other personal qualities among them such as critical thinking, accuracy or teamwork, which are essential in research practice.

GOAL

To develop competence in the management and development of basic laboratory techniques, acquiring the necessary skills in results assessment, organization and the practical application of theoretical concepts which cover various subjects.

PRIOR KNOWLEDGE

Previous knowledge to be required comprise those pertaining the previous degree courses

COURSE SYLLABUS

1. Egg lisozyme purification. Activity assay. SDS-gel electrophoresis.
2. Characterization of lactate- dehydrogenase isoforms. Native conditions gel electrophoresis.
3. Identification of an unknown microorganism: sugar fermentation assay, hemolysis assay, catalase assay, mobility test, oxidase assay, Gram stain test.
4. Determination of minimum inhibitory concentration.
5. Quorum sensing. Detection of N-acyl-homoserin lactones (AHL) from Gram(-) bacteria, by the agar diffusion assay.
6. Bacterial transformation with an ampicillin resistant plasmid.
7. Isolation and purification of human genomic DNA.
8. Miniprep of plasmid DNA from an Eschericia coli culture.
9. Amplification of polymorphic loci by PCR technique

EDUCATION ACTIVITIES

The Labo 2 Course will be developed mainly by performing laboratory experiments conducted by the teacher. These practical classes will be complemented by seminars and tutorials lab with the teacher. In addition, all activities will be supported by the Web page of the course.

- Practical sessions: In these classes the students will perform experimental work in the laboratory using techniques and theoretical subjects related to the second degree course in biotechnology knowledge. In advance to the practical sessions, the students will be handed a Lab Manual. During and after completion of the practical sessions, the students are expected to describe and analyze the obtained results and to come to significant conclusions. This information must be written down in the Lab Notebook.

- Laboratory seminars: work sessions in the classroom, conducted by the professor, in which the students will be asked to present and discuss the results obtained during the practical laboratory session.

- Tutorials: upon the student´s request and in the schedule established for this purpose, the professor will answer questions and solve issues that might arise during the course, in order to guide the student throughout the learning process.

- Web page of the course: The Web page access is restricted to students enrolled in the course and is within the Virtual Classroom of the UFV. It serves as support classroom teaching, providing the student information on the subject as well as materials and means of support required for their personal work. It also facilitates student contact with the teacher through electronic tutorials, discussion forums, etc.

DISTRIBUTION OF WORK TIME

CLASSROOM-BASED ACTIVITY	INDEPENDENT STUDY/OUT-OF-CLASSROOM ACTIVITY
73 hours	77 hours

SKILLS

Basic / general / cross skills

Students must have demonstrated knowledge and understanding in an area of study that is founded on general secondary education. Moreover, the area of study is typically at a level that includes certain aspects implying knowledge at the forefront of its field of study, albeit supported by advanced textbooks

Students must be able to apply their knowledge to their work or vocation in a professional manner and possess skills that can typically be demonstrated by coming up with and sustaining arguments and solving problems within their field of study

Students must have the ability to gather and interpret relevant data (usually within their field of study) in order to make judgments that include reflections on pertinent social, scientific or ethical issues

Students must be able to convey information, ideas, problems and solutions to both an expert and non-expert audience

Students must have developed the learning skills needed to undertake further study with a high degree of independence

To acquire firm theoretical, practical, technological and humanistic training needed to develop professional activity.

To have acquired the ability for analytical, synthetic, reflective, critical, theoretical and practical thought.

To be able to plan time effectively.

To foster a concern for knowledge as a key tool in the personal and professional growth process of a student.

To develop capacity for and a commitment to learning and personal development.

To develop oral and written communication skills.

To understand the fundamental laws and principles of physics, mathematics, chemistry and biology as the foundation for the mental structure of a biotechnician.

To acquire the skills needed for experimental work: design, preparation, the compilation of results and the obtainment of conclusions, understanding the limitations of an experimental approach.

Specific skills

To work suitably in a laboratory with biological material (bacteria, fungi, viruses, animal and plant cells, plants and animals) and with regard to the safety, handling and disposal of biological waste.

To be able to design and suitably execute an experimental protocol based on theoretical knowledge in a host of subjects.

To be familiar with and apply the rules and general principles of health and safety in laboratories.

To organise and suitably plan work in the laboratory.

To identify and define laboratory instruments and materials.

To be able to describe, quantify, analyse and critically assess the results of experiments performed in the laboratory.

To be able to approach a subject by means of rigorous, profound and comprehensive thought.

Capacity for written and oral communication of the knowledge acquired.

To be able to apply the theoretical knowledge acquired for solving problems and practical cases linked to the various subjects.

To be able to assess the knowledge acquired.

LEARNING RESULTS

To develop safe working habits in the lab

To perform an enzymatic assay correctly and determine the kinetic parameters of an enzyme

To identify a microorganism's biochemical and metabolic characteristics for its subsequent identification and classification.

To use nucleic acid isolation, purification and separation techniques correctly

To use techniques correctly in order to establish a bacteria's competence state

To carry out the horizontal gene transfer mechanism correctly

To carry out the PCR technique

To develop a notebook that allows for the tracking of experiments

To apply the fundamentals achieved during the lab sessions in order to obtain the desired results

To be able to draw conclusions from the experimental results

LEARNING APPRAISAL SYSTEM

For the evaluation of the Integrated Laboratory 2 course, attendance and participation in practical sessions will be taken into account, as will two exams – one practical and the other theoretical - on the subject.

Attendance to all practical sessions is both mandatory and indispensable so as to be eligible for the practical and theoretical examinations. Non-attendance to any of these sessions without corresponding valid justification will result in failing the course.

- Practical work: this experimental work will be assessed by means of a practical exercise at the end of the course. This test amounts to 70% of the final grade. It will take into account the work undertaken and results achieved in the laboratory (35%) and the submission of a final report on the experiment (35%). A minimum grade of 4 out of 10 will be necessary to pass the course.

- Theoretical final exam (30%): this will be carried out at the end of the course and will comprise questions and problems related to the practical laboratory sessions. The exam amounts to 30% of the final grade. A minimum grade of 4 out of 10 will be necessary to pass the course.

Each student must keep a lab notebook updated on the work done in the laboratory. This notebook may be revised by the teacher at any time during the practical sessions.

BIBLIOGRAPHY AND OTHER RESOURCES

Basic

J. Sambrook, D. Russell. The Condensed Protocols From Molecular Cloning: A Laboratory Manual. Cold Spring Harbor Laboratory Press, Fourth Edition, 2012

Additional

Freifelder D. Physical Bioquemistry: Aplications to Biochemistry and Molecular Biology. Barcelona: W.H. Freeman & Co.;1992.

K. Wilson y J. Walker. Principles and Techniques of Practical Biochemistry. 5th ed. Cambridge University Press; 2000.

Griffiths AJF, Wessler SR, Lewontin RC, Carroll SB. Introduction to Genetic Analysis. 9th ed. New York: W.H Freeman; 2008.

Brown, A. Benson's Microbiological Applications: Laboratory Manual in General Microbiology. Short Version. 9th ed. McGraw-Hill; 2008.

Cullimore, D. R. Practical Atlas for Bacterial Identification. 2nd ed. CRC Lewis Publication. Boca Raton; 2010.