VNIVERSITAT DE VALÈNCIA

Course Guide
33181 Integrated internship methods in cellular and molecular biology

COURSE DATA

DATA SUBJECT

Code: 33181
Name: Integrated internship methods in cellular and molecular biology
Cycle: Undergraduate Studies
ECTS Credits: 4.5
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
1111 - Grado en Biotecnología	Facultat de Ciències Biològiques	3	Second quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1111 - Grado en Biotecnología	Cellular and molecular methodology	COMPULSORY

COORDINATION

TORRES IBAÑEZ JOSE MANUEL

SUMMARY

This course aims to provide students with an integration of previously acquired knowledge in subjects such as Molecular Biology, Molecular Genetics, Methods in Biochemistry and Molecular Biology, Methods in Molecular Biology and Genetic Engineering and generation of transgenic organism.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS

There are no prerequisites, although it is highly recommended to take or have taken Molecular Biology (33174), Cell Biology (33173), Methods in Molecular Biology and Genetic Engineering (33178), Cellular Technologies (33180) and Transgenic Organisms adquisition (33182).

COMPETENCES / LEARNING OUTCOMES

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Actuar con autonomía en el aprendizaje, tomando decisiones fundamentadas en diferentes contextos, emitiendo juicios en base a la experimentación y el análisis y transfiriendo el conocimiento a nuevas situaciones

Apply analytical, synthetic and critical thinking skills in the application of the scientific method.

Be able to use recombinant DNA techniques and design protocols.

Colaborar eficazmente en equipos de trabajo, asumiendo responsabilidades y funciones de liderazgo y contribuyendo a la mejora y desarrollo colectivo

Conocer las bases químicas y moleculares del funcionamiento celular

Conocer las herramientas para la manipulación de células así como las principales técnicas microscópicas y sus aplicaciones

Conocer las técnicas básicas que se utilizan para los estudios de expresión génica y para la manipulación del material genético.

Conocer los principios y la metodología básica de la transformación genética de los diferentes organismos

Conocer y comprender, desde el propio ámbito de la titulación, las desigualdades por razón de sexo y género en la sociedad; integrar las diferentes necesidades y preferencias por razón de sexo y de género en el diseño de soluciones y resolución de problemas

Contribuir en el diseño, desarrollo y ejecución de soluciones que den respuesta a demandas sociales, teniendo en cuenta como referente los Objetivos de Desarrollo Sostenible

Demostrar razonamiento crítico y autocrítico en el ámbito de la titulación, considerando aspectos tales como la ética profesional, los valores morales y las implicaciones sociales de las diferentes actividades realizadas

Design protocols for the separation, purification and characterisation of biological molecules.

Diseñar protocolos de separación, purificación y caracterización de moléculas biológicas

Disponer de conocimientos básicos sobre la base celular y molecular del sistema inmune y los fundamentos de los métodos experimentales con base inmunológica

Know how to grow and maintain cells in vitro.

Know how to use immunological techniques in qualitative and quantitative tests.

Manejar adecuadamente los equipos y el material propio de un laboratorio de bioquímica y biología molecular

Participate in multidisciplinary teams, engaging in teamwork and collaboration.

Properly handle the equipment and material of a biochemistry and molecular biology laboratory.

Propose creative and innovative solutions to complex situations or problems, typical of the area of ¿¿¿¿connection, to donate responses to the various professional and social needs

Que el estudiantado demuestre su capacidad para calcular correctamente los parámetros relevantes de un proceso o un experimento mediante la representación de los datos experimentales

Saber comunicarse de manera efectiva, tanto de forma oral como escrita, adaptándose a las características de la situación y de la audiencia

Saber cultivar y mantener células in vitro

Saber diseñar y construir un organismo transgénico.

Saber utilizar las técnicas inmunológicas en ensayos cualitativos y cuantitativos

Saber utilizar las técnicas microscópicas en sus distintas aplicaciones.

Ser capaz de diseñar protocolos y utilizar las técnicas del DNA recombinante

Ser capaz de observar e interpretar los resultados obtenidos a través de microscopios ópticos

Use English to write reports and to interpret information from protocols, manuals and databases.

Work in laboratories, including safety procedures, waste management and accurate activity logging.

DESCRIPTION OF CONTENTS

1. Introduction and monitoring

Sessions prior to start the work in the laboratory:
Students approach the problem to be solved experimentally and the method of work followed during the development of the subject.
Students present in groups the experimental strategy to tackle the problem that is proposed. After a period of discussion students have to create the final protocol
Subsequent sessions to work in the laboratory:
Presentation and discussion of final results. Carrying out a questionnaire regarding fundamental aspects that must have been assimilated.

2. Laboratory of Genetics

-Separation of digestion fragments from agarose gel and subsequent purification.
-Ligation reaction and transformation of E. coli.

-Colony-PCR to identify positive clones.
-Extraction of plasmid DNA from the positive colonies.
-Confirmation of positive clones by digestion with restriction enzymes.
-Quantification of DNA and preparation for transfection.

3. laboratory of Cell Biology

- Culture of mammalian cells, spreading of the cells to be transfect
- Transfection of mammalian cells with the plasmids obtained in the thematic unit 2.
- Double immunofluorescence to detect expression of luciferase and GFP
- Analysis of results from the fluorescence microscopy experiments.

4. Laboratory of Biochemistry

- Collection cell extracts.
- Preparation of polyacrylamide gel.
- Measurement of luciferase activity.
- Electrophoresis, transfer, blocking and antigen detection.
- Discussion of the results

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	9,00
Laboratory	36,00
Total hours	**45,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	25,00
Independent study and work	0,00
Preparation of lessons	20,00
Preparation for assessment activities	20,00
Resolution of case studies	0,00
Total hours	**65,00**

TEACHING METHODOLOGY

This course will feature several lectures, with high student participation expected. Students will be required to give a brief presentation on the strategy they plan to use to address the proposed problem or analyze the progress of the experiments they are conducting.

Most of the contents are transmitted by practical lectures that seek a high degree of autonomy in the design and development of the experiments.

EVALUATION

In this course is based on the following sections:

1. a maximum of 1.5 points
a maximum of 2.5 points
. Besides, they should be able to compare their studies with other similar published in a research paper that will be previously provided for their consideration. a maximum of 6.5 points.

the course will be the four sections . It is mandatory that attended all classroom and laboratory sessions.

-the final mark of the exam (section 3) must be equal to or greater than 5/10, having obtained a mark equal to or greater than 4.50 in each one of its three parts (Genetics, Cellular Biology and Biochemistry and Molecular Biology)

two notes (initial proposal and laboratory notebook) 4 (out of 10).

If an student has not passed the subject but the score in the section 1 is equal or higher than 5 (out of 10), it would not be necessary to repeat this activity during the two following courses.

REFERENCES

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- AUSUBEL, F.M. et al. (1987-97). Current protocols in Molecular Biology. John Wiley & sons.
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