

**COURSE DATA****Data Subject**

Code	43097
Name	Molecular medicine technology
Cycle	Master's degree
ECTS Credits	4.5
Academic year	2019 - 2020

Study (s)

Degree	Center	Acad. year	Period
2142 - M.U. en Aproximaciones Moleculares CC Salud 12-V.2	Faculty of Biological Sciences	1	Second term

Subject-matter

Degree	Subject-matter	Character
2142 - M.U. en Aproximaciones Moleculares CC Salud 12-V.2	1 - Molecular technologies for research in health sciences	Obligatory

Coordination

Name	Department
LOPEZ RODAS, GERARDO	30 - Biochemistry and Molecular Biology
O'CONNOR BLASCO, JOSE ENRIQUE	30 - Biochemistry and Molecular Biology
SALGADO BENITO, JESUS	30 - Biochemistry and Molecular Biology

SUMMARY

The subject will introduce the student to the concept of Molecular Medicine Targets and their identification, structural characterization and validation for their application in the development of innovative Therapies. To fulfill this teaching objective, the new molecular and genetic techniques used in the investigation of the mechanisms and causes of the disease will be presented to the student. The syllabus of the subject will include lessons on advanced technologies in current Biomedicine.

This subject includes the collaborative activity of the CIBER-ISCIII. Most of the lessons will be taught by external professors, researchers of recognized prestige of the Institute of Biomedicine of Valencia (IBV-CSIC), coordinated by the director of the same (Jordi Pérez-Tur). The IBV-CSIC professors participating in the present edition of the subject are the Doctors: Vicente Rubio, Jerónimo Bravo, Marçal Vilar, José Luis Llácer, Clara Marco, Susana Rodríguez-Navarro, Helena Mira, Nuria Flames, Carmen Cucarella, Marta Married, Paloma Pérez, Alberto Marina, Pilar González-Cabo and Natalia Tapia. The subject also has the participation of professors from the Department of Biochemistry and Molecular



Biology of the University of Valencia (UVEG), who will teach specific topics related to radiometric and radiodiagnostic methods (Prof. Gerardo López-Rodas) and with Proteomics (Prof Manuel Sánchez del Pino), as well as the realization of a practical part directed to the learning and application of In Silico methods of modeling proteins known as targets in Cell Signaling and Oncological Therapy (Prof. Jesús Salgado).

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

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

Other requirements

None

OUTCOMES

2142 - M.U. en Aproximaciones Moleculares CC Salud 12-V.2

- Students should apply acquired knowledge to solve problems in unfamiliar contexts within their field of study, including multidisciplinary scenarios.
- Students should be able to integrate knowledge and address the complexity of making informed judgments based on incomplete or limited information, including reflections on the social and ethical responsibilities associated with the application of their knowledge and judgments.
- Students should communicate conclusions and underlying knowledge clearly and unambiguously to both specialized and non-specialized audiences.
- Students should demonstrate self-directed learning skills for continued academic growth.
- Students should possess and understand foundational knowledge that enables original thinking and research in the field.
- Conocer en profundidad y comprender la organización a nivel molecular de células, sistemas y procesos de relevancia en las Ciencias de la Salud.
- Conocer en profundidad y comprender las bases moleculares de la enfermedad.
- Conocer en profundidad y comprender las metodologías de investigación básica aplicables a las Ciencias de la Salud.
- Tener capacidad de analizar y sintetizar un problema.
- Tener capacidad de comunicación oral y escrita en una segunda lengua científica.
- Tener capacidad de trabajar en equipo
- Tener capacidad de desarrollar un trabajo interdisciplinar.



- Conocer y comprender los conceptos básicos y las aplicaciones en investigación básica y clínica de las Tecnologías de la Medicina Molecular.
- Conocer, comprender y aplicar en la práctica Tecnologías de la Medicina Molecular en situaciones relacionadas con la investigación básica y clínica.
- Aprender a identificar, manejar y presentar adecuadamente en informes y exposiciones públicas, conocimientos existentes sobre Tecnologías de la Medicina Molecular, usando como vehículo la lengua inglesa.
- Aprender a identificar, manejar y presentar adecuadamente en informes y exposiciones públicas, conocimientos existentes sobre células madre, usando como vehículo la lengua inglesa.

LEARNING OUTCOMES

1. To know and understand the basic concepts and applications in basic and clinical research in Molecular Medicine Technology
2. To know, understand and apply in practice Molecular Medicine Technology in situations related to basic and clinical research.
3. To learn to identify, manage and present reports and statements properly public knowledge on Molecular Medicine Technology, using the English language as a vehicle.

DESCRIPTION OF CONTENTS

1. Introduction to the course

It will review the issues to be addressed in the course, highlighting how the use of the technologies that will be described can help to understand the molecular basis of disease.

2. Targets in Molecular Medicine

3. The value of Genetics in target identification

4. Structural identification of targets

Cristallography and X-Ray Diffraction
Nuclear Magnetic Resonance
Electron Microscopy

**5. Target Validation and Models of Disease**

Target Validation at the macromolecular level.

Unicellular models: bacteria and yeast.

Cellular models.

Invertebrate models.

Vertebrate models: Zebra fish and Medaka fish.

Vertebrate models: Mouse, rat and pig models.

6. Development of Innovative Therapies

Identification of small molecules acting on targets.

Proteins and Nucleic acids as drugs.

Gene Edition and Gene Therapy.

Regenerative Therapy

7. Radioisotopes and Electromagnetic Radiation (EMR) in Molecular Medicine**8. Proteomics in Molecular Medicine****9. Radiopharmaceuticals of clinical use for diagnostic purposes****10. In Silico Modelling in Molecular Medicine****WORKLOAD**

ACTIVITY	Hours	% To be attended
Group work	15,00	100
Theory classes	15,00	100
Seminars	15,00	100
Development of group work	37,50	0
Study and independent work	30,00	0
TOTAL	112,50	



TEACHING METHODOLOGY

The subject is devised to be developed in the form of face and non-face work.

Actual teaching of this subject will be made by the following methodological approaches: magistral lectures, development of practical work based on bibliography managing and tutoring assistance.

In the lectures will present an overview of the topic, with special emphasis on the key concepts. At the same meeting it will indicate the most appropriate resources for a deepening of the subject so that students complete their education in the same

EVALUATION

Assessment of student learning will be performed by assessing the following sections:

- 1) Theoretical exam, a test type that will be done in the classroom. This test will be worth up to 50% of the final grade and will be done at the end of the semester in which the subject is taught. It will include questions from the theoretical and practical lessons taught by the professors of the Institute of Biomedicine of Valencia (IBV) and the Department of Biochemistry and Molecular Biology.
- 2) Work done by the student on topics suggested by the teacher and oral exposure of the same 40%. Before the beginning of the subject, the faculty of the same will propose the offer of topics. Each student will have to choose an individual subject, without overlapping any other student. For their evaluation, individual presentations will be made to all the classmates of the subject, assessing the content and form of the presentation, as well as the ability to induce questions by the audience. The set of all the presentations will occupy a maximum time of 15 hours.
- 3) Student Interest in the subject, expressed as participation in organized discussions, the answers to the questions that the teacher performed during the sessions, personal tutoring assistance and / or any other activity conducted by the student in relation to the subject. From these concepts can achieve up to 10% of the final grade for the course.

REFERENCES

Basic

- Trent, RJ. Molecular Medicine, Fourth Edition: Genomics to Personalized Healthcare. Academic Press (2012)
- Runge, MS, Patterson, C. Principles of Molecular Medicine. Humana Press(2009)
- Runge, MS, Patterson, C, McKusick,VA. Principles of Molecular Medicine, Humana Press (2006)
- Boulwood J, Fidler,C eds. Methods in Molecular Medicine: Molecular Analysis of Cancer. Totowa, NJ: Humana Press (2002)



- Killeen AA, ed. Methods in Molecular Medicine. Molecular Pathologyv Protocols.: The Humana Press (2000)

Additional

- Los distintos profesores de la asignatura proporcionarán referencias bibliográficas específicas al inicio de la misma.

ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

1. Contents:

The contents initially collected in the teaching guide are maintained.

2. Work Volume and Time Planning:

There have been no changes in the temporary planning of teaching.

The weight of the different activities in ECTS credits marked in the original teaching guide is maintained.

3. Teaching Methodology:

At the time of the incidence, the face-to-face classes of the subject had been completed.

The tutorials of the subject will be carried out through the Virtual Classroom forum or by personal email.

4. Evaluation:

The evaluation of student learning will be carried out by evaluating the following sections:

1) **Theoretical exam, of quizz, type** that will be carried out through the Virtual Classroom. This test will be worth up to 30% of the final grade.

The test will consist of a battery of 15 quizz questions rated 0 or 1 points. The battery will include questions from the theoretical and practical lessons taught by the professors of the Department of Biochemistry and Molecular Biology. For each question, there will only be one correct answer, to choose between four possibilities. Each wrong answer will subtract 0.25 points.

The questions will appear randomly for each person and a short deadline will be set for their completion. If the student does not have the means to establish this connection and access the Virtual Classroom, they must contact the professors by email at the time of publication of this annex to the Teaching Guide.

In the case of students who state that they cannot be evaluated in a remote manner, as proposed here, an oral exam via videoconference is given as an option, on an agreed and flexible date.



2) **Oral presentation of a practical work prepared individually** by the student on topics proposed by the professors of the Institute of Biomedicine of Valencia. This part will be worth up to 60% of the final grade. Before the start of the course, each IBV teacher will propose the offer of topics. Each student will have to choose an individual subject, without overlapping with any other student. For their evaluation, individual presentations will be made through the CONNECTA tool provided by the CSIC. Each student will send the presentation in pdf format to the teacher in advance. On the agreed date, each student will make their presentation at CONNECTA, which allows them to go slide to slide and interact with the teacher, having a chat in case of any problem with the audio. The content and form of the presentation will be valued, as well as the ability to answer the teacher's questions.

If the student does not have the means to establish this connection and access the tool, he/she should contact the teaching staff by email at the time of publication of this annex to the Teaching Guide.

3) **Interest of the student in the subject**, expressed as their participation in the organized discussions, the answers to the questions that the teacher made during the face-to-face sessions, attendance at personal tutorials and / or any other type of activity carried out by the student in relation to the subject. Up to 10% of these concepts can be achieved in the final grade for the course.

5. Bibliography:

The recommended bibliography is maintained as it is accessible to students.