

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

Code	44700
Name	Current Issues in biomedical research
Cycle	Master's degree
ECTS Credits	6.0
Academic year	2023 - 2024

Study (s)

Degree	Center	Acad. year	Period
2224 - M.U. Investigación y Desarrollo en Biotecnología Biomedicina	Faculty of Biological Sciences	1	First term

Subject-matter

Degree	Subject-matter	Character
2224 - M.U. Investigación y Desarrollo en Biotecnología Biomedicina	3 - Research and development in biomedicine	Obligatory

Coordination

Name	Department
GIL HERRERO, M LUISA	275 - Microbiology and Ecology
PIQUERAS RUIZ, LAURA	135 - Pharmacology

SUMMARY

This subject is integrated, along with the subjects of "Case Studies in biomedicine and biotechnology" and "Biomedicine and society" in the module denominated "R & D in biomedicine". In this course the current challenges of biomedical research will be discussed. We currently have no effective and definitive treatment for many diseases of high incidence in the population, such as cancer and many neurodegenerative, cardiovascular, psychiatric, metabolic or autoimmune disease treatments as well as for most rare diseases. The development of new treatments for such diseases and their translation to the clinic is a lengthy process that requires understanding the pathophysiological mechanisms, identification of therapeutic targets, the development of active compounds with biological activity related to these targets and the development and optimization of the drug use in various preclinical phases. Due to the complexity of biological processes molecular targets need to be validated in in vitro and in vivo models to demonstrate that they are indeed involved in the onset and /or progression of a disease. For this purpose, experimental models of disease in different organisms are required to assess the validity of therapies in preclinical and proof of concept studies. In this subject, experimental approaches used in biomedical



research to solve human health problems will be presented, steps from basic research to clinical trials and other issues related to the transfer of basic research to the patient and its return will be discussed ("bench to bedside" and "bedside to bench" concepts). Teaching will include seminars given by specialists, who will explain the biomedical problem from their research and professional experience, and discussion sessions on the specific topics. Students will move to the centers of basic and clinical research where such specialists carry out their task for the sessions.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

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

Other requirements

OUTCOMES

2224 - M.U. Investigación y Desarrollo en Biotecnología Biomedicina

- 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.
- Be able to integrate new technologies in their professional and/or research work.
- Ser capaces de analizar de forma crítica tanto su trabajo como el de su compañeros.
- Capacidad de seleccionar y gestionar los recursos disponibles (instrumentales y humanos) para optimizar resultados en investigación.
- Ser capaces de realizar una toma rápida y eficaz de decisiones en situaciones complejas de su labor profesional o investigadora, mediante el desarrollo de nuevas e innovadoras metodologías de trabajo adaptadas al ámbito científico/investigador, tecnológico o profesional en el que se desarrolle su actividad.
- Ser capaces de acceder a la información necesaria en el ámbito específico de la materia (bases de datos, artículos científicos, etc.) y tener suficiente criterio para su interpretación y empleo.



- Aplicar el razonamiento crítico y la argumentación desde criterios racionales.
- Aplicar la Ciencia desde la óptica social y económica, potenciando la transferencia del conocimiento a la Sociedad.
- Capacidad para preparar, redactar y exponer en público informes y proyectos de forma clara y coherente, defenderlos con rigor y tolerancia y responder satisfactoriamente a las críticas que pudieren derivarse de su exposición.
- Ser capaces de trabajar en equipo, sin discriminación entre hombres y mujeres, con eficiencia en su labor profesional o investigadora adquiriendo la capacidad de participar en proyectos de investigación y colaboraciones científicas o tecnológicas.
- Capacidad para desarrollar los resultados científicos obtenidos por uno mismo o por otros científicos a las aplicaciones prácticas de rentabilidad social y/o económica.
- Ser capaz de aplicar los conocimientos adquiridos en la identificación de salidas profesionales y yacimientos de empleo.
- Adquirir las habilidades personales que faciliten la inserción y desarrollo profesional.
- Conocer y usar las técnicas y herramientas de búsqueda de empleo.
- Considerar el emprendimiento como alternativa profesional.
- Motivación por la calidad y la mejora continua, actuando con rigor, responsabilidad y ética profesional.
- Respeto a los derechos fundamentales y de igualdad entre hombres y mujeres.
- Capacidad de proyectar los conocimientos, habilidades y destrezas adquiridos para promover una sociedad basada en los valores de la libertad, la justicia, la igualdad y el pluralismo.
- Aprendizaje en la redacción de artículos científicos en los campos de la Biomedicina y la Biotecnología.
- Manejar adecuadamente las fuentes de información científica y poseer la habilidad de hacer una valoración crítica de las mismas, integrando la información para aportar conocimientos a grupos de investigación multidisciplinares.
- Utilizar adecuadamente las herramientas informáticas, métodos estadísticos y de simulación de datos, aplicando los programas informáticos y la estadística a los problemas biomédicos y biotecnológicos.
- Dominar el método científico, el planteamiento de protocolos experimentales y la interpretación de resultados en el ámbito biomédico y biotecnológico.
- Ser capaces de aplicar la experiencia investigadora adquirida tanto en la empresa privada como en organismos públicos.
- Saber diseñar estrategias experimentales multidisciplinares en el ámbito de las biociencias moleculares para la resolución de problemas biológicos complejos, especialmente los relacionados con salud humana.



- Adquirir destrezas en el manejo de las metodologías avanzadas empleadas en las biociencias moleculares y en el registro anotado de actividades.
- Mejorar la capacidad de trabajar con seres vivos o muestras biológicas.
- Conocer las aplicaciones de los nuevos conocimientos emergentes en el diagnóstico, prevención y tratamiento de las enfermedades humanas.
- Saber aplicar los principios éticos y legales de la investigación científica en biotecnología y biomedicina.
- Profundizar en el papel del profesional en biotecnología y biomedicina en el contexto científico y social y su contribución en el modelo económico.
- Conocer y saber aplicar los criterios de evaluación de riesgos en biotecnología y biomedicina.
- Conocer los elementos fundamentales de la comunicación y percepción pública de las innovaciones biotecnológicas y biomédicas y de los riesgos asociados a ellas.
- Saber utilizar un lenguaje integrador y no discriminatorio en todos los ámbitos de la comunicación anteriormente mencionados.

LEARNING OUTCOMES

1. Managing scientific databases, abstracts, full articles, etc., necessary to complete their training in the field of biomedicine and to solve biomedical problems.
2. Adequate usage of proper and objective biomedical literature.
3. Knowledge on how to write critical reports on the quality of the scientific evidence examined, with a scholar presentation of the literature.
4. Managing presentations and discussions of the work developed, according to several scientific formats (oral, poster, article, review).

DESCRIPTION OF CONTENTS

1. Current challenges of biomedical research.

Translational research on prevalent diseases as well as in rare diseases. Some topics that may be covered in this part of the course include: aging and related diseases, diseases related to metabolism, orphan diseases and rare diseases, cancer and biomedical research, translational oncology, advanced therapies, regenerative medicine and tissue engineering, research in neurology, challenges in immunology and hematology, severe infections, pre-obesity and cardiometabolic risk, cardiovascular disease, biomarkers, free radicals and inflammation, reproductive biology, among others.

**2. Experimental approaches in biomedical sciences.**

In this part of the subject different methodological and conceptual tools of transversal nature, which contribute to the advancement of biomedical research, will be considered. Some topics that may be covered in this part of the course include: analytical and separative flow cytometry, medical imaging, pharmacogenomics and personalized medicine, studies in model organisms applied to biomedicine and biotechnology, biomedical database management data, genetic diagnostics, nanomedicine.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	60,00	100
Development of individual work	20,00	0
Study and independent work	60,00	0
Resolution of case studies	20,00	0
TOTAL	160,00	

TEACHING METHODOLOGY

Lectures (27 h): Aimed at obtaining basic knowledge. The dogmatic and heuristic methods for the presentation of the fundamental concepts and the relevant contents of the subject with audiovisual support will be used.

Seminars (23 h): Taught by specialists who develop their activity in different hospital research centers. They will present strategies for the resolution of specific problems in the development of professional and research activity in different fields of biomedicine.

Case method (10h): Different cases / problems will be proposed to be solved by the students and discussed in classroom sessions under the supervision of specialists.

Individual work (40 h). It will consist in the elaboration of a written work developing basic questions related to some of the cases raised in the seminars.

EVALUATION

The evaluation will take into account the following aspects:

- The formative assessment throughout the course, based on the resolution of problems and activities (66,6%).
- Evaluation of the paper (33,3%).



To pass the course will require assistance to 80% of the sessions and obtaining a score greater than or equal to 50% within each section evaluated.

REFERENCES

Basic

- 1. Base de Datos PubMed. U.S. National Library of Medicine and the National Institutes of Health <http://www.pubmed.com>
- 2. Cochrane Library. Biblioteca Cochrane Plus <http://www.cochrane.org>
- 3. EMEA. Agencia europea del Medicamento <http://www.emea.eu.int/>
- 4. Agencia Española del Medicamento <http://www.agemed.es>
- 5. OMS. Organización Mundial de la Salud <http://www.who.int/en/>
- 6. <http://www.ont.es/Paginas/Home.aspx>