



COURSE DATA

Data Subject

Code	44700
Name	Current Issues in biomedical research
Cycle	Master's degree
ECTS Credits	6.0
Academic year	2024 - 2025

Study (s)

Degree	Center	Acad. year	Period
2224 - Master's Degree in Research and Development in Biotechnology and Biomedicin	Faculty of Biological Sciences	1	First term

Subject-matter

Degree	Subject-matter	Character
2224 - Master's Degree in Research and Development in Biotechnology and Biomedicin	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

COMPETENCES (RD 1393/2007) // LEARNING OUTCOMES (RD 822/2021)

2224 - Master's Degree in Research and Development in Biotechnology and Biomedicin

- 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.
- Critically analyse one's own work and that of colleagues.
- Select and manage available resources (instrumental and human) to optimise research outcomes.
- Make rapid and effective decisions in complex situations within one's professional or research activity by developing new and innovative working methodologies adapted to the scientific/research, technological or professional field in which the activity takes place.
- Access the necessary information within the specific subject area (databases, scientific articles, etc.) and have sufficient judgement to interpret and apply it.



- Apply critical reasoning and argumentation based on rational criteria.
- Apply science from a social and economic perspective, promoting the transfer of knowledge to society.
- Prepare, write and present reports and projects in public in a clear and coherent manner, defend them with rigour and tolerance and respond satisfactorily to any criticism that may arise from the presentation.
- Work in a team, without discriminating between men and women, carry out professional or research work efficiently and acquire the ability to participate in research projects and scientific or technological collaborations.
- Develop scientific results obtained by oneself or other scientists into practical applications with social and/or economic profitability.
- Apply the knowledge acquired to identify career opportunities and sources of employment.
- Gain personal skills that facilitate professional integration and development.
- Know and use job search techniques and tools.
- Consider entrepreneurship as a professional alternative.
- Demonstrate motivation for quality and continuous improvement, acting with rigour, responsibility and professional ethics.
- Demonstrate respect for fundamental rights and equality between men and women.
- Project the knowledge, skills and competencies acquired to promote a society based on the values of freedom, justice, equality and pluralism.
- Aprendizaje en la redacción de artículos científicos en los campos de la Biomedicina y la Biotecnología.
- Handle scientific information sources appropriately and assess them critically, integrating the information to contribute knowledge to multidisciplinary research teams.
- Make proper use of IT tools, statistical and data simulation methods, applying IT tools and statistics to biomedical and biotechnological problems.
- Master the scientific method, the design of experimental protocols and the interpretation of results in the biomedical and biotechnological fields.
- Apply research experience acquired both in private companies and public organisations.
- Design multidisciplinary experimental strategies in the field of molecular biosciences to solve complex biological problems, especially those related to human health.
- 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.



- Apply ethical and legal principles of scientific research in biotechnology and biomedicine.
- Deepen understanding of the role of biotechnology and biomedicine professionals within the scientific and social context and their contribution to the economic model.
- Know and apply risk assessment criteria in biotechnology and biomedicine.
- Understand the key elements of communication and public perception of biotechnological and biomedical innovations and the risks associated with them.
- Use inclusive and non-discriminatory language in all the above-mentioned areas of communication.

LEARNING OUTCOMES (RD 1393/2007) // NO CONTENT (RD 822/2021)

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 be carried out taking into account the following aspects:

- The formative assessment throughout the course: based on the resolution of problems and activities (80%).
- Preparation of a report (20%).

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

REFERENCES**Basic**



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- 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>
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