VNIVERSITAT DE VALÈNCIA

Course Guide
36348 Molecular Biosciences: history, experimentation and society

COURSE DATA

Data Subject	
Code	36348
Name	Molecular Biosciences: history, experimentation and society
Cycle	Grade
ECTS Credits	8.0
Academic year	2024 - 2025

Study (s)

Degree	Center	Acad. year	Period
1109 - Degree in Biochemistry and Biomedical Sciences	Faculty of Biological Sciences	1	First term

Subject-matter

Degree	Subject-matter	Character
1109 - Degree in Biochemistry and Biomedical Sciences	4 - Biología	Basic Training

Coordination

Name	Department
GUILLEM LLOBAT, XIMO	225 - History of Science and Documentation
PEREZ DEL OLMO, ANA	355 - Zoology

SUMMARY

BCM: history, research, society is a basic, compulsory subject in the branch of science, which is included in the biologia matter, within the module General scientific basis. It has a total of 8 ECTS credits that will be held throughout the year in the first year of the degree. The course includes two large blocks, Experimentacion-sociedad and Historia-Sociedad which will be held in the first quarter.

The first block is intended to facilitate the adaptation of students to the academic, administrative, social and cultural environment of the Universitat de València, given its impact on academic performance. Below, is intended to introduce the student in research activities through the acquisition of a number of skills and basic knowledge that will enable it to develop in the field of experimental sciences. Thus, the course you must familiarize yourself with the different sources of scientific information and new technologies, will learn to engage in a research laboratory as well as the rules for the use of basic scientific instruments, management and the legislation on animal experimentation, etc. Ultimately, he is that it acquires basic knowledge that will be used throughout the rest of the courses that make up the degree, both from the perspective of search and processing of information, its presentation in different

formats or use of scientific English, to learn to use different devices in common use in the laboratory, handling animals properly or know the debris according to dangerous. It is also intended to provide students knowledge on professional skills of biochemists and Biochemistry and biomedical sciences as a profession, and its impact and its relationship with society.

The second block is intended to provide students with information and a critical attitude towards scientific knowledge in its relationship with society and culture. It discusses the origins and evolution of biological sciences and more specifically of molecular biosciences. It provides the conceptual tools to analyze and understand the meaning of biomolecular technoscience in contemporary society and stimulates a critical analysis of current trends in life sciences, their social implications, their link to social policies and to moral conflicts. With this perspective, students will analyze an update of: knowledge production systems; scientific practices; factors for the development of biological knowledge; the main elements of the practical and conceptual revolution caused by the molecular sciences in the twentieth century; and the new social role of scientists in the 21st century.

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 specified enrollment restrictions with other subjects of the curriculum.

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

1109 - Degree in Biochemistry and Biomedical Sciences

- Have capacity for analysis, synthesis and critical reasoning in the application of the scientific method.
- Be able to think in an integrated manner and approach problems from different perspectives.
- Understand the natural world as a product of evolution and its vulnerability to human influence.
- Develop an ethical commitment and the capacity to participate in the social debate.
- Be able to use new information and communication technologies.
- Know how to use the different bibliographic sources and biological databases and be able to use bioinformatic tools.
- Know the usual procedures used by scientists in the area of molecular biosciences and biomedicine to generate, transmit and disseminate scientific information.
- Understand experimental approaches and their limitations and interpret scientific results in molecular biosciences and biomedicine.
- Know how to work responsibly and rigorously in the laboratory, considering the safety aspects in experimentation as well as the legal and practical aspects of the handling and disposal of waste.

- Know the ethical and legal principles of scientific research in molecular biosciences and biomedicine.
- Understand the role of the expert in molecular biosciences and biomedicine in the scientific and social context.
- Understand the relationships between science and society and the position of molecular biosciences and biomedicine in the context of current science.
- Students must have acquired knowledge and understanding in a specific field of study, on the basis of general secondary education and at a level that includes mainly knowledge drawn from advanced textbooks, but also some cutting-edge knowledge in their field of study.
- Students must be able to apply their knowledge to their work or vocation in a professional manner and have acquired the competences required for the preparation and defence of arguments and for problem solving in their field of study.
- Students must have the ability to gather and interpret relevant data (usually in their field of study) to make judgements that take relevant social, scientific or ethical issues into consideration.
- Students must be able to communicate information, ideas, problems and solutions to both expert and lay audiences.
- Students must have developed the learning skills needed to undertake further study with a high degree of autonomy.
- Learn to work safely in the laboratory.
- Show initiative and leadership for multidisciplinary teamwork and cooperation.

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

• Develop capacity for critical thinking, fostering communication and discussion of content in order to stimulate the creative individual.

• Ability to work in groups when dealing with problematic situations collectively.

• Ability to argue from rational criteria, clearly differentiating what is debatable as they are made or accepted scientific evidence.

• Ability to interact with both the teacher and with peers.

• Interest in social and economic application of science.

• Interest in popular science and the impact of science on culture and consciousness of society.

• Ability to interact seamlessly with the various services and human resources for the benefit and use UVEG individual performance

DESCRIPTION OF CONTENTS

1. BLOCK 1. EXPERIMENTATION-SOCIETY. PART I

I.-ADDITION TO THE TITLE, THE UNIVERSITY STUDY AND TECHNIQUES.

1.1. Structure of the University of Valencia (Universitat, faculty, departments, ADR and representation of students).
1.2. Resources and Services University (DISE, CADE, SFP, CAL, Library, Sports, Medical Service, Web of the University).
1.3. Structure of the degree.

2. BLOCK 1. EXPERIMENTATION-SOCIETY. PART II

II.-HANDLING OF EXPERIMENTAL ANIMALS.

Session 1. Basics of handling animals I: Experimental animal. Laboratory animals. Species used.Classification and health category. Facilities for laboratory animals. Basics of handling animals II: Nutrition and feeding of laboratory animals. Biological rhythms.Animal welfare. Pain and stress. Analgesia, anesthesia and euthanasia. Hygiene and health monitoring. Zoonoses.

Session 2. Legislation on animal testing: ethical and moral principles. Ethics Committees. Legislation regional, national and international levels. Training of personnel. Alternative methods to animal testing.

3. BLOCK 1. EXPERIMENTATION-SOCIETY. PART III

III.EXPERIMENTAL LABORATORY

Practice 1. - Handling of biological material. This lab will show the student how to proceed to the capture, processing and conservation of biological material.
Practice 2. - Introduction to the use of the micropipette assessing the presence and activity of the catalase enzyme in different animal and plant tissues
Practice 3. - Differentiation of microbial types. Since different types of microbial cultures observations will be made to learn to differentiate by the appearance of the colonies: shape, size, color, refraction, and so on.
Practice 4. - Handling of laboratory animals. The purpose of this lab is to teach students the guidelines for the handling of some animals commonly used in research laboratories in Biotechnology and Biochemistry and CC Biomedical.
Practice 5. - Dissection of animals. This practice is intended for students to become familiar with the material and the mechanics of the dissection process and in turn learn to identify, extract and prepare the samples required for biological processing following practice.
Practice 6. - Histological processing of biological samples. The processing of biological samples for histology is one of the most complex processes in the laboratory. This lab will explain the work process and different stages.
Practice 7.- The use of the micropipette assessing the presence and activity of the catalase enzyme in

different animal and plant tissues

4. EXPERIMENTATION-SOCIETY. PART IV

IV.-INFORMATION AND COMMUNICATIONS TECHNOLOGIES (ICT)

A.-Teoric sessions

-Elements in scientific communication
-Publications
-Documentation and scientific information
-Bibliographic information
-Storage and retrieval of bibliographic information

B.-Practices

Practice 1. - This session will begin by introducing basic concepts necessary to develop search strategies.

Practice 2. - Introduction of software that allows, through an Internet browser, the storage of references and further processing for use in publications.

Practice 3. - This final session will cover the tools available in the software used related to the creation and use of bibliographic styles.

C.-Problems

Session 1. - Reading, discussion and summary of outreach work.
Session 2. - Practical exercises on publications.

D.-Literature search.

E.-Preparation of a popular article and a virtual panel.

5. BLOCK 1.EXPERIMENTATION-SOCIETY. PART V

V.-THE PROFESSION OF BIOCHEMICAL

-Introduction to the Biochemistry and Biomedical Sciences as a profession, professional skills (2h).
- Workshop on job search, what work the biochemical?(2 h).

6. BLOCK 2. HISTORY-SOCIETY .PART I. THEORETICAL LESSONS

1. The main stages of evolution of modern science. Elements for the transition to modernity. The "scientific revolution" in biology (methodology, gender, power, sites). Universities and scientific academies. Models of scientific change

2. The development of experimental biology (19th century) and its controversies: animal experimentation, scientific instruments and the experimental method. The birth of the evolutionary paradigm. Social Darwinism. Science theories as considered in philosophy and sociology.

3. The molecularization of biology. Origins of Mendelian genetics and biochemistry. Eugenics. The emergence of molecular biology (20th century): From the protein to DNA. The central dogma of molecular biology. The birth of genetic engineering and the new biotechnologies (basic lines of development). The regulation of biotechnology and of intellectual property in the biosciences. The ethical, economic and social dimensions of the new biotechnologies.

7. BLOCK 2. HISTORY-SOCIETY. PART II. THEMATIC PRACTICAL LESSONS

1. Students will analyze science communication in academic and in popular science journals

2. Reading and review of a book included among the bibliography proposed by the professor

3. Trips. There will be two guided tours in exhibitions or museums dealing with topics related to the course and student will carry out specific activities in order to analyze the role of museography and museology in the popularization of scientific knowledge

4. Seminars. Addressing the social and ethical implications of molecular biosciences through the discussion of a range of themes proposed by the professor

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	32,00	100
Classroom practices	23,00	100
Laboratory practices	14,00	100
Computer classroom practice	8,00	100
Tutorials	3,00	100
Preparation of evaluation activities	120,00	0
TOTAL	**200,00**	

TEACHING METHODOLOGY

BLOCK 1.

Part II Handling of experimental animals

This part of the course is to introduce students in the basics of handling both laboratory animals and the national and international legislation on animal experimentation.

Part III Experimental Laboratory

This part of the course is to introduce students, in a practical way in the recognition and management of basic instruments in the laboratory of biochemistry. This basic training in instrumentation and methods will be reinforced throughout the degree in the different specific subjects.

Part IV Information and Communication Technologies (ICT)

For practical reasons, this part of the course can be grouped into two main groups: Sources of Bibliographic Information: In this first section defines the basic concepts of "scientific documentation". The following is a descriptive study of the main types of primary and secondary scientific literature and introduces the concept of reference literature. This is also the issue of storage of information, with particular emphasis on the subsequent retrieval of this information, primarily through electronic means. This section will motivate reading, comprehension and analysis of scientific texts, with special interest in the management of scientific English. Publication of Scientific Results: It try that the student to learn the structure and parts of any scientific publication. In all practical approaches to care publications development and writing of scientific information and enhance the scientific knowledge of English.

Practices

All practice session computer room, the teacher / to explain a series of concepts and tools in the first part of the session. The ultimate goal of these practices is that the student / to acquire the skills necessary to obtain information from bibliographic databases, knowledge stored in a personalized and organized and can use it later for their scientific work.

Problems

The aim of these sessions is, by raising various activities, work on different aspects necessary to present scientific results in different formats.

Literature search. In this activity, and on a proposed topic, the student / to carry out a literature search in different databases (based on the experience of the practical sessions) and store in specific programs. Once reviewed and eliminated irrelevant information, the student/to create a document based on the proposed bibliographic style practices and will rise to Virtual Classroom for evaluation.

Preparation of a popular article and a virtual panel. In this activity the student/to be able to choose between 5 and 10 references found in literature search and, by reading the summaries, prepare a short article on the subject of disclosure, following the structure explained in the lectures, and set out in a virtual panel. Also may use data or results of any other part of the same subject.

Part V The profession of Biochemical

Introduction to the Biochemistry and Biomedical Sciences as a profession, professional skills.

- Workshop on job search, what work the biochemical?.

BLOCK 2.

The work and learning process will integrate various complementary activities:

1. Lectures in the classroom: will consist of two sessions per week in which the teacher will present and discuss the main issues of the program (see the section on theory contents).

2. Seminars and practical work in the classroom: will consist of a weekly session in which students work with a variety of sources: scientific texts, databases, popular science texts, films or newspaper articles.

3. Reading and critical commentary on a book selected from the literature given by the teacher.

4. Trips. There will be one guided tour into an exhibition or museum dealing with topics related to the course and student will carry out specific activities in order to analyze the role of museography and museology in the popularization of scientific knowledge.

5. Oral communications by groups. The groups of students will present a work analyzing the social and ethical implications of molecular biosciences and these presentations will serve as a starting point for the discussion in the classroom.

6. Tutorials. Tutoring sessions will be optional. Students have three hours per week of free consultation with the teacher in relation to academic work being carried out.

EVALUATION

On a total of 10 points, each of the two blocks will have 5 points. It is necessary to approve each of the two blocks.

BLOCK 1

Proposes the following distribution of a maximum of 5 points (is have of reaching 2.5 points to approve this block

Questionnaires for evaluation (up to 3 points)

It will perform a face questionnaire collected classroom where choice questions from part 3 of the course. It is a condition for approving the questionnaire to pass the subject.

Evaluation of activities (up to 2 points)

This section assessed the activities to be performed by the student, both direct and non-contact. It is a condition to evaluate this part of the student / to do and overcome each. Failure to pass the course in the first call will save all the activities surpassed until the second call. All these activities should be conducted during the first semester of the academic year. If not done in this period may not pass the course.

Making outreach article	**0,5 puntos**
Bibliographic search	**0,5 puntos**
Summary reading of articles reporting	**0,25 puntos**
Virtual poster	**0,5 puntos**
Working with an scientific article	**0,25 puntos**
TOTAL	***2 puntos***

BLOCK 2

Theoretical examination of the contents of the course syllabus: up to 3 points (to pass the course students must obtain at least 30%) The exam will include questions dealing with the historical contextualization and the critical analysis of the main issues addressed in the course.

Practical work in the classroom: up to 1 point (in order to be evaluated, all of them must be submitted)

Reading and critical analysis of a book: up to 0.5 points

Work on the exhibitions and museums: up to 0.5 points.

(For the evaluation of the practical sessions the professor will take into account the attendance, participation and attitude in the classroom as well as the communication abilities and the mastery of contents)

REFERENCES

Basic

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Referencia b2: Barona Vilar, J.L. (2002). Història del pensament biològic. Valencia, PUV.
Referencia b3: Bowler, P. & Morus,I. (2007). Panorama general de la ciencia moderna. Barcelona, Crítica.
Referencia b4: Camprubí i García, P. (1997). La profesión de biólogo. Madrid, Ed. Colegio Oficial de Biólogos.
Referencia b5: Chalmers, A.F. (1993). ¿Qué es esa cosa llamada ciencia? Madrid, Siglo XXI.
Referencia b6: Collins, H. & Pinch, T. (1996). El golem: lo que todos deberíamos saber acerca de la ciencia. Barcelona, Crítica.
Referencia b7: Fara, P. (2009). Historia de la ciencia. Barcelona, Ariel.
Referencia b8: Morange, M. (1994). Histoire de la biologie moleculaire. Paris, La Découverte.
Referencia b9: Zúñiga, J.M., Orellana, J.M. y Tur, J.A., 2008.- Ciencia y tecnología del animal de laboratorio. Vols. I y II. Editan Univ. Alcalá y S.E.C.A.L.

Additional

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Referencia c1: Barrass, R. (2002). Scientists must write. Routledge Falmer.
Referencia c2: Berry, R. (1986). How to write a research paper. Oxford, Pergamon Press

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Referencia c3: Campanario, Juan Miguel, http://www2.uah.es/jmc/webpub/INDEX.html. Como escribir y publicar un artículo científico. Universidad de Alcalá, Alcalá de Henares.

- Referencia c4: Carreras, A. (1994). Guía Práctica para la elaboración de un trabajo científico. Bilbao, CITA.
- Referencia c5: Day, R. A. (2006). How to write and publish a scientific paper. 6th Edition. Greenwood Press
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- Referencia c8: Kay, L.E. (1993). The molecular vision of life: Caltech, the Rockefeller foundation and the rise of the new biology. New York, Oxford University Press.
- Referencia c9: Kholer, R.E. (1982). From medical chemistry to biochemistry: the making of a biomedical discipline. Cambridge, Cambridge University Press.
- Referencia c10: Lannon, J. M. (1996). Technical writing. 7th Edition. Scott Foresman & Co.
- Referencia c11: Madigan M.T., Martinko J.M., Parker J.(1997). Biología de los Microorganismos. Prentice Hall.
- Referencia c12: Ministerio de Trabajo y Asuntos Sociales, Instituto Nacional de Seguridad e Higiene en el Trabajo. Normativa NTP 276: Eliminación de residuos en el laboratorio: procedimientos generales.
- Referencia c13: Página web del Colegio Oficial de Biólogos de la Comunidad Valenciana http://www.cobcv.org
- Referencia c15: Publicaciones del Servei de Seguretat, Salut i Qualitat Ambiental. http://www.uv.es/DSSQA/general/documentacio.htm
- Referencia c16: Shapin, S. (2000). La revolución científica: una interpretación alternativa. Barcelona, Paidos.
- Referencia c7: Guerrini, A. (2003). Experimenting with humans and animals: from Galen to animal rights. Baltimore, John Hopkins University Press.
- Referencia c14: Pestre, D. (2008). Ciència, diners i política. Assaig dinterpretació. Santa Coloma de Queralt, Edendum URV.