# COURSE DATA

## DATA SUBJECT

**Code:** 36348
**Name:** Molecular Biosciences: history, experimentation and society
**Cycle:** Undergraduate Studies
**ECTS Credits:** 8
**Academic year:** 2026-27

## STUDY (S)

| Degree | Center | Acad. year | Period |
|---|---|---|---|
| 1109 - Degree in Biochemistry and Biomedical Sciences | Facultat de Ciències Biològiques | 1 | First quarter |

## SUBJECT-MATTER

| Degree | Subject-matter | Character |
|---|---|---|
| 1109 - Degree in Biochemistry and Biomedical Sciences | Biología | BASIC |

## COORDINATION

PEREZ DEL OLMO ANA

GUILLEM LLOBAT XIMO

# SUMMARY

This is a basic, compulsory subject within the "biologia" matter, part of the module General scientific basis. It consists 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 to research activities through the acquisition of essential skills and basic knowledge that will enable it to develop in the field of experimental sciences. Thus, the course you must familiarise 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 or, handling animals properly. It is also intended to provide students with 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 analyse 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 moral conflicts. With this perspective, students will analyse 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 for other subjects.

## COMPETENCES / LEARNING OUTCOMES

### 1109 - Degree in Biochemistry and Biomedical Sciences

Be able to think in an integrated manner and approach problems from different perspectives.

Be able to use new information and communication technologies.

Develop an ethical commitment and the capacity to participate in the social debate.

Have capacity for analysis, synthesis and critical reasoning in the application of the scientific method.

Know how to use the different bibliographic sources and biological databases and be able to use bioinformatic tools.

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.

Know the usual procedures used by scientists in the area of molecular biosciences and biomedicine to generate, transmit and disseminate scientific information.

Learn to work safely in the laboratory.

Show initiative and leadership for multidisciplinary teamwork and cooperation.

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 be able to communicate information, ideas, problems and solutions to both expert and lay audiences.

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 have developed the learning skills needed to undertake further study with a high degree of autonomy.

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.

Understand experimental approaches and their limitations and interpret scientific results in molecular biosciences and biomedicine.

Understand the natural world as a product of evolution and its vulnerability to human influence.

Understand the relationships between science and society and the position of molecular biosciences and biomedicine in the context of current science.

Understand the role of the expert in molecular biosciences and biomedicine in the scientific and social context.

## DESCRIPTION OF CONTENTS

***BLOCK 1***

**1. EXPERIMENTATION-SOCIETY. PART I. ENROLLMENT IN THE DEGREE AND THE UNIVERSITY**

- Structure of the University of Valencia (University, faculty, departments, ADR, and student representation).

- Resources and services of the University (DISE, CADE, SFP, CAL, Library, Sports, Medical Service, University Website).

- Structure of the degree.

**2. EXPERIMENTATION-SOCIETY. PART II. HANDLING OF LABORATORY ANIMALS**

- Basic notions of animal handling I: Animal experimentation. Laboratory animals. Most commonly used species. Health classification and category. Facilities for laboratory animals.

- Basic notions of animal handling II: Nutrition and feeding of laboratory animals. Biological rhythms. Animal welfare. Pain and stress. Analgesia, anaesthesia, and euthanasia. Hygiene and health control. Zoonoses.

- Legislation on animal experimentation: Ethical and moral principles. Ethics committees. Regional, national, and international legislation. Training of specialised personnel. Alternative methods to animal experimentation.

**3. EXPERIMENTATION-SOCIETY. PART III. THE EXPERIMENTAL LABORATORY**

Practice 1: Instruments for observing biological samples. The essential parts of the microscope and magnifying glass will be described, and students will become familiar with their use.

Practice 2: Handling biological material. Students will learn how to capture, process, and preserve biological material.

Practice 3: Differentiation of microbial types. From cultures of various microbial types, observations will be made to learn how to differentiate them by colony appearance: shape, size, colour, refringence, etc.

Practice 4: Handling of laboratory animals. The objective is to show students the guidelines for handling commonly used animals in research laboratories in Biotechnology, Biochemistry and Biomedical Sciences.

Practice 5: Dissection of animals. Students will become familiar with the tools and process of dissection and learn to identify, extract, and prepare the required samples for the next biological processing practice.

Practice 6: Histological processing of biological samples. This complex laboratory process will be explained, and its different stages will be practised.

Practice 7: Introduction to the use of the micropipette by evaluating the presence and activity of the enzyme catalase in different animal and plant tissues.

**4. EXPERIMENTATION-SOCIETY. PART IV. INFORMATION AND COMMUNICATION TECHNOLOGIES**

A. Theoretical sessions
- Elements in scientific communication
- Publications
- Scientific documentation and information
- Bibliographic information
- Storage and retrieval of bibliographic information

B. Practical sessions
Practice 1: Introduction to basic concepts necessary to develop search strategies.
Practice 2: Introduction to software that allows, through an internet browser, the storage of bibliographic references and their later use in publications.
Practice 3: Tools available in the software related to the creation and use of bibliographic styles.

C. Problem-solving sessions
Session 1: Reading, discussion, and summary of scientific outreach works.
Session 2: Practical exercises on publications.

D. Bibliographic search

E. Writing a scientific outreach article and a virtual poster.

**5. EXPERIMENTATION-SOCIETY. PART V. THE BIOMEDICAL SCIENCE GRADUATE PROFESSION**

- Introduction to Biochemistry and Biomedical Sciences as a profession, professional competencies.

- Round table with professionals from Biochemistry and Biomedical Sciences.

- Field trips. Guided visits to research centres and companies in the Science Park.

***BLOCK 2***

**6. HISTORY-SOCIETY. PART I. THEORY**

- Origins of science. The major stages in the evolution of modern science. Transition factors to modernity. The scientific revolution in biology (methodology, gender, power, spaces). Universities and scientific academies. Models of scientific change.

- 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. Scientific theory: considerations from philosophy and sociology.

- The molecularization of biology. Origins of Mendelian genetics and biochemistry. Eugenics. Emergence of molecular biology (20th century): from protein to DNA. The central dogma of molecular biology. The birth of genetic engineering and new biotechnologies. Regulation of biotechnologies and intellectual property in biosciences. The ethical, economic, and social dimensions of new biotechnologies.

**7. HISTORY-SOCIETY. PART II. PRACTICAL ACTIVITIES**

- Thematic practice sessions. These will analyse scientific communication in both specialised fields and scientific outreach.

- Reading and critical commentary on a book selected from a bibliography proposed by the professor.

- Field trip. A guided visit will be made to an exhibition or museum directly related to the course content, with specific activities to analyse the role of museology and museography in the popularization of scientific knowledge.

- Seminars. These will address the social and ethical dimensions of molecular biosciences through the discussion of a set of topics proposed by the professor.

## WORKLOAD

### PRESENCIAL ACTIVITIES

| Activity | Hours |
|---|---|
| Tutorials | 3,00 |
| Theory | 32,00 |
| Laboratory | 14,00 |
| Computer classroom practice | 8,00 |
| Classroom practices | 23,00 |
| **Total hours** | **80,00** |

### NON PRESENCIAL ACTIVITIES

| Activity | Hours |
|---|---|
| Attendance at other activities | 0,00 |
| Individual or group project | 0,00 |
| Independent study and work | 0,00 |
| Preparation of lessons | 0,00 |
| Preparation for assessment activities | 120,00 |
| Resolution of case studies | 0,00 |
| **Total hours** | **120,00** |

## TEACHING METHODOLOGY

***BLOCK 1***

**PARTS 1 and 2**
- *Theoretical sessions in the classroom*.

**PART 3**
- *Practical laboratory sessions*.

**PART 4**
- *Theoretical sessions in the classroom*. These sessions will address topics related to the storage and retrieval of bibliographic information, and the general structure of any publication will be studied, highlighting common elements of scientific documents and analysing in particular the "scientific article" and "posters" as key formats in the training of a biochemist.

- *Practical sessions in the computer classroom*. These sessions aim to ensure that students acquire the necessary skills to obtain information from bibliographic databases, store it in an organised manner, and use it for their scientific work.

- *Problem-solving sessions in the computer classroom*. Activities will focus on the necessary aspects for presenting scientific results in various formats.

- *Bibliographic search*. Students will perform a search on a given topic, store the data using specific software, eliminate irrelevant information, and generate a document based on the bibliographic style studied in class. This will be submitted for evaluation.

- *Writing a scientific outreach article and a virtual poster*. Students will select 5 to 10 references from their bibliographic search, read the abstracts, and write a short scientific outreach article based on the explained structure, which will be represented in a virtual poster. Data from other course sections may also be used.

**PART 5**
- *Theoretical sessions in the classroom*.

- *Round table with professionals* in Biochemistry and Biomedical Sciences.

- *Field trips*.

***BLOCK 2***

- *Theoretical classroom sessions* where the professor will present and discuss the different topics of the program.

- *Practical work*. Students will use various sources: scientific texts, databases, *scientific outreach* texts, films, or press articles.

- *Reading and critical commentary* on a book selected from a bibliography proposed by the professor.

- *Field trip*. Guided visit to an exhibition or museum.

- *Group project presentations (seminars)*. These projects will analyse the social and ethical dimensions of molecular biosciences and serve as a basis for class debate.

- *Tutorials*. Optional. Students will have three hours of free consultation with the professor regarding the academic work of the course.

Each of the two blocks will be graded out of 5 points. Both blocks must be passed.

## EVALUATION

It will be necessary to pass each of the two blocks in order to calculate the average in the subject.

***BLOCK 1***

The following distribution of the **5 points is proposed** *(minimum 2.5 points required to pass this block):*

**Assessment questionnaire (3 points)**
A classroom test with multiple-choice questions on Part 3 (The experimental laboratory). Passing this test is required to pass the block.

**Assessment of activities (2 points)**
This includes all mandatory in-class and out-of-class student activities. All activities must be completed and passed to be assessed. If the course is not passed in the first session, the passed activities will be retained for the second session.

| | |
|---|---|
| Scientific outreach article | **0,5 points** |

| | |
|---|---|
| Bibliographic search | **0,5 points** |
| Summary of scientific outreach article readings | **0,25 points** |
| Virtual poster | **0,5 points** |
| Scientific article reconstruction | **0,25 points** |
| *TOTAL* | ***2 points*** |

***BLOCK 2***

Distribution of the **5 points** (*a minimum of 2.5 is required to pass*):

**Theoretical exam**: up to 3 points (minimum 40% required to pass). Includes medium and long-form questions on historical context and critical reflection.

**Classroom practical works**: up to 1 point (all must be submitted to be assessed).

**Book reading and critical commentary**: up to 0.5 points.

**Museology work**: up to 0.5 points.

(Practical work evaluation will consider attendance, participation, attitude, presentation skills, and content mastery)

## REFERENCES

BASIC


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ADDITIONAL


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