

Academic Year/course: 2021/22

## 26702 - Biology

### Syllabus Information

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**Academic Year:** 2021/22

**Subject:** 26702 - Biology

**Faculty / School:** 104 - Facultad de Medicina

229 - Facultad de Ciencias de la Salud y del Deporte

**Degree:** 304 - Degree in Medicine

305 - Degree in Medicine

**ECTS:** 6.0

**Year:** 1

**Semester:** First semester

**Subject Type:** Basic Education

**Module:**

## 1. General information

### 1.1. Aims of the course

Biology is a basic subject whose objective is to help the Student for learning and understanding of concepts and theories about cellular Biology and human heredity and genome. The final aim consists of that the Student acquires a total formation for comprehension of other subjects in following academic courses. To transmit the need and interest for achievement of knowledge taking into account the high relevance of biomedical research in the development of current Medicine is also intended.

These approaches and objectives are aligned with the following Sustainable Development Goal (SDG) of the United Nations 2030 Agenda, in such a way that the acquisition of the learning results of the subject provides training and competence to contribute to a certain extent to its achievement: Health and well-being (Goal 3).

### 1.2. Context and importance of this course in the degree

Biology, as transversal subject of Module I, includes basic concepts in Medicine Degree.

It is given for first semester and provides the basis indispensable for student to know and apply the concepts, principles, models and theories which constitute the current biological knowledge about cell.

This subject is necessary to go in depth into the cell and human heredity and genome because contents of future subjects (Histology, Physiology, Medical Genetics, Pharmacology?) will be based on it. The integrated study of all these subjects will allow the Student to acquire an absolute knowledge about morphology, structure and function of human body at different stages in the life.

### 1.3. Recommendations to take this course

Biology is a mandatory subject with transversal nature in first course of Medicine Degree. Since students attending this subject can come from different sources, matter corresponding to *2º de Bachillerato* is recommended to update in order to unify the level of knowledge.

## 2. Learning goals

### 2.1. Competences

CB1- Students should have demonstrated to have acquired knowledge about this specific subject not only based on that provided in Secondary School but also included in novel studies.

CB2- Students should know how to apply their knowledge in this specific subject on their career and to argue also solve problems regarding it.

CB3- Students should have the ability to interpret relevant data in order to give opinion about social, scientific or ethical issues on the basis of their own reflection.

CB4- Students should have the ability to transmit information, ideas, problems and solutions to specialized and non-specialized audience.

CB5- Students should have developed those abilities to learning necessary to perform independent subsequent studies.

CE1- To know cellular structure and function. Biomolecules. Metabolism. Metabolic regulation and integration.

CE3- Cellular communication. Excitable membranes. Cellular cycle. Cellular differentiation and proliferation. Gene expression and regulation. Heredity. Human embryogenesis and organogenesis.

C5- To handle material and basic lab techniques.

C7- To macroscopically and microscopically recognize morphology and tisular structure, organs and systems.

## 2.2. Learning goals

The course includes a series of learning tasks through which the Student should demonstrate to have the ability to:

- To describe and analyze the structure and function of a eukaryotic cell as a basis of human tissues.
- To explain the basic principles of heredity and human genome organization and functionality.
- To understand and recognize the molecular bases of disease at the cellular level.
- To integrate acquired knowledge about this and other subjects from the first course of Degree (Histology, Biochemistry, and Physiology).
- To have the ability to perform a critical analysis of questions and new advances in Biology with social impact.

## 2.3. Importance of learning goals

Learning outcomes of this subject are directly linked to competences proposed in the Medicine Degree curriculum. They can be grouped:

1. To define and relate structure and function of organelles in the eukaryotic cell. It is essential for Student to achieve understanding of cell as fundamental basis of life (Competences: 1 - 7, 23, 30, 31).
2. To identify and describe different levels of cellular organization by appropriate methodologies. It will allow the Student to integrate this knowledge about Biology and other subjects of the Degree (Competences: 24 - 27).
3. To explain, at molecular level, basic concepts defining human genome as well as biological processes involved in their phenotypic expression. Thus, the Student will be capable to understand cellular and genetic disorders responsible for disease (Competences: 10 - 12, 17 - 23, 28 - 31).
4. To know and understand concepts regulating human heredity and to have ability to apply them in order to evaluate different heredity types and solve transmission of inheritance in health also in disease (Competences: 8, 9, 13 16, 23, 30, 31).

Moreover, some of the overall objectives are linked to competences (Competences: 32 - 36).

## 3. Assessment (1st and 2nd call)

### 3.1. Assessment tasks (description of tasks, marking system and assessment criteria)

The Student will have to demonstrate that he/she has achieved those established learning outcomes by means of the following evaluation activities:

1.

**Theory:** Two exams (as a minimum) will be performed including choice and short-answer questions. Capacity to express, summarise and relate concepts will be assessed. The objective of this exam will consist of demonstrating that Student has acquired those competences previously defined.

Marks achieved here will represent 80% of final marks.

**Practice:** The objective is to check that Students achieved the defined competences.

1. Laboratory practice: When more than two absences occur, the Student will perform an exam whose passing is mandatory.
2. Cellular ultrastructure (electron microscopy): A written exam for identification of cellular structures will be performed. It will be complementary (20%) to theory mark (5/10 is required)
3. Genetics problem resolution: Different problems and practical cases will be to be solved by the Student. It will be complementary (20%) to theory mark (5/10 is required)
4. Seminar exposition and supplementary tasks: An individual assessment about training and exposition abilities will be developed. It will be mandatory.

2.

**Final exam:** For those students who cannot be assessed by continuous evaluation or have not previously eliminated the matter. It is required to get 5/10.

It is required to get 4 / 10 in each theoretical as well as practical exam in order to average.

**Final qualification** (as sum of all marks in each exam):

- 0 - 4.9 Suspenso (SS)
- 5.0 - 6.9 Aprobado (AP)
- 7.0 - 8.9 Notable (NT)
- 9.0 - 10 Sobresaliente (SB)

**Date and time for exams in Zaragoza:**

<https://medicina.unizar.es/horarios>

**Date and time for exams in Huesca:**

<https://fccsyd.unizar.es/horarios-y-calendarios-medicina>

## 4. Methodology, learning tasks, syllabus and resources

### 4.1. Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as lectures in which the syllabus will be developed through an expositive methodology with presentations by the teacher, developing the different didactic units to the complete group; problem-solving sessions and seminars in which the methodology will be active, attempting the greater involvement of the students

### 4.2. Learning tasks

The course includes the following learning tasks:

Practice sessions, which are organized according to the different thematic sections:

- Practices of identification of images of cellular ultrastructure (Electron Microscopy): They consist in the interpretation and discussion of ultrastructural images, relating the structure and cellular function. They will be developed in parallel to the didactic units, once acquired the theoretical knowledge descriptive of the ultrastructure of the different organelles. 10 hours per student.
- Visit to *Servicio de Microscopía electrónica*. They are carried in small groups (1 hour per student)
- Problem-solving sessions and Genetic Problems: Students will have beforehand the statement of the different problems that must work individually, to solve in class the difficulties encountered. 10 hours per student.
- Laboratory sessions: They are carried in small groups, being their general objective that the students handle the optical microscope with ease, while they make stains and begin in different methods of study of the cell:
  - Principles of optical microscopy.
  - Observation of bacteria, yeasts, and buccal epithelium.
  - Osmotic phenomena.
  - Realization of cell cultures: Technique of explants.
  - Establishment, staining, and observation of cells in culture
  - Observation of the phases of mitosis.
  - Human karyotype.

Every student will be informed about the risks that the practice of this subject can carry out, as well as if dangerous products are handled and what to do in case of an accident, and must sign the commitment to comply with the work and safety rules in order to them. For more information, consult the information for students of the Unit of Prevention of Occupational Hazards: <http://uprl.unizar.es/estudiantes.html>

- In FCCSD,

Given the exceptional situation of the Academic Year 2021-2022, the large group teaching system will be online, that is to say, in a synchronic telematic system, by which teachers and students will be connected through technologies that allow interaction, such as Google Meet.

### 4.3. Syllabus

The course will address the following topics:

- Plasma membrane structure.
- Cell junctions, cell adhesion and extracellular matrix.
- Membrane transport of small molecules.

- Membrane transport of large particles and macromolecules: endocytosis and exocytosis.
- Mechanisms of cell communication. Signal transduction.
- The cytoskeleton: Actin filaments. Intermediate Filaments. Microtubules.
- Cytosol. Ribosomes.
- Intracellular compartments and protein sorting. Endoplasmic reticulum. Golgi apparatus.
- Lysosomes. Peroxisomes.
- Mitochondria.
- Interphase nucleus. Cellular division.
- The cell cycle.
- Apoptosis.
- Cell differentiation.
- Stem cells.
- The structure and cycle of chromosomes.
- Basic genetics mechanisms: Types of heredity. Interaction between genes and environment.
- Genetic linkage and recombination. Haplotypes.
- DNA, chromosomes and genomes.
- Control of gene expression.
- Genetic mutation. Polymorphisms.
- DNA repair.
- Oncogenes and cancer.

#### **4.4. Course planning and calendar**

Lectures will be adapted to the academic calendar.

Practice sessions will begin one week after the beginning of the lecture classes.

The schedule of the seminars and practical classes of each week, as well as the distribution of the students, will appear beforehand, on the bulletin board of the subject and in the network.

The dates of presentation of works will be agreed individually with each of the teachers responsible.

#### **4.5. Bibliography and recommended resources**

THE UPDATED BIBLIOGRAPHY OF THE SUBJECT IS CONSULTED THROUGH THE LIBRARY'S WEB

<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=26702>