Teaching guide

IDENTIFICATION DETAILS

Degree:	Pharmacy
Scope	Pharmacy
Faculty/School:	Experimental Sciences
Course:	GENERAL BIOLOGY
Type:	Basic Training
ECTS credits:	6
Year:	1
Code:	2512
Teaching period:	First semester
Subject:	Biologics
Module:	Biologics
Teaching type:	Classroom-based
Language:	Spanish
Total number of student study hours:	150

SUBJECT DESCRIPTION

The subject of General Biology provides students with basic knowledge of the structural and functional properties of cells. In particular, it is intended that the student knows the structure and function of each organelle and compartment of the eukaryotic cell and the interrelation between them to carry out cellular functions, as well as the capacity for relationship and coordination between cells in multicellular organisms.

The course of General Biology is a biannual basic training course taught in the first semester of the Degree in Pharmacy. This course is integrated into the Biology module, which aims to lay the necessary foundations for obtaining solid and integrated knowledge of Pharmacy.

The cell is the basic unit of all organisms. Knowledge of cells is essential to understand the different levels of organization of organisms and their functioning. The subject of General Biology provides students with basic knowledge of the structural and functional properties of cells. In particular, it is intended that the student knows the structure and function of each organelle and compartment of the eukaryotic cell and the interrelation between them to carry out cellular functions, as well as the capacity for relationship and coordination between cells in multicellular organisms. The knowledge of these basic aspects about the organization of organisms will allow the student to answer questions that every scientist asks himself, from which he can reformulate deeper questions about the origin of life and man.

In addition, the subject of General Biology is a completely necessary subject, since it will lay the foundations for being able to approach and understand subjects of the Degree in Pharmacy in subsequent courses. You will be able to learn about the cell as a pharmacological target, the cell as a factory of therapeutic components and its application in cell therapy.

Ever since Rudolf Virchow rejected the idea that illness was a whole-body affliction in the 19th century and proposed that it was the result of a cellular alteration, the study of the cellular basis of the disease has been very important in medicine and therefore in the study of new therapies for curing diseases. Nowadays, and especially after the sequencing of the Human Genome, there is an increasingly marked tendency to study and understand diseases from the point of view of molecules. But identifying mutated genes or altered expression patterns is not enough to understand the disease. The study of the functions of these gene products in the cellular context is necessary, and therefore the discipline of Cell Biology remains very important in Pharmacy, since it allows us to know the causes of the disease for the study of new therapies and to understand how pharmacological action takes place on the body.

GOAL

Obtain a complete and integrated view of the cell as a morphological and functional unit, coordinated with the rest of the cells in multicellular organisms and understand the mechanisms of cell signaling

PRIOR KNOWLEDGE

The student who accesses the subject should have a good basic background in biology and chemistry. Especially knowledge about the nature of carbohydrates, lipids, proteins and nucleic acids, which will allow you to approach the knowledge that is included in the subject. In particular, it would be desirable for students to have taken the course of Biology in the 2nd year of high school. It is also very advisable for the student to have a good level of English that allows them to keep track of the specific bibliography of the subject.

COURSE SYLLABUS

The agenda to be developed will be:

I. INTRODUCTION AND BASIC CONCEPTS.

II. ORGANIZATION OF THE EUKARYOTIC CELL.

III. CELL REGULATION.

THEORETICAL PROGRAM.

I. INTRODUCTION AND BASIC CONCEPTS.
TOPIC 1. Introduction. Content and organization of the course. Concept of Cell Biology. Levels of organization in Biology. Units of measurement used in Cell Biology. Cell theory. Study methods in Cell Biology.
TOPIC 2. Origin and evolution of cells. Domains and kingdoms of living organisms and their characteristics. Prokaryotic cells and eukaryotic cells. Organization and general structure of eukaryotic cells.

II. ORGANIZATION OF THE EUKARYOTIC CELL.
TOPIC 3. Cell membranes. Cell membrane system: the plasma membrane and the endomembrane system. Lipids and membrane fluidity. Organization. Membrane proteins. Protein movements. Molecular model of the plasma membrane. Glycocalyx.
TOPIC 4. Membrane transport. Passive, active conveyors. ATPase pumps. Ion channels
TOPIC 5. The core. The nuclear envelope. Nuclear pores and nuclear foil. Transport through the core. Internal organization of the nucleus. Nucleolus. Nucleolar organizer. DNA structure. Chromatin. Chromosomes
TOPIC 6. Replication and transcription of genetic material. DNA replication. DNA transcription.
TOPIC 7. Translation. RNA processing. Structure and composition of ribosomes. Protein synthesis. Protein degradation mechanisms. Proteosome.
TOPIC 8. Cytoplasmic organelles: endoplasmic reticulum: types, structure and organization, protein synthesis, intracellular protein signaling and trafficking, and lipid synthesis. Golgi apparatus: structure and organization; protein glycosylation, signaling and intracellular protein trafficking.
TOPIC 9. Vesicles. Vesicular traffic and exocytosis. Constitutive and regulated secretion processes.
TOPIC 10. Mitochondria. Electron transport chain. Protein transport to the mitochondria. Chloroplasts. Peroxisomes.
TOPIC 11. Cytoskeleton. Microtubules. Composition and structure. Microtubule organizing centers. Assembly. Dynamic microtubule instability. Microtubule associated proteins (MAPs). Structure of cilia and flagella. Motor proteins. Microfilaments. Actin filaments. Associated proteins. Myosin filaments. Cell motility and organization of the cytoskeleton. Muscle contraction. Intermediate filaments. Structure, types and location. Cell movement.

III. CELL REGULATION.
TOPIC 12. Cell adhesion, cell junctions and extracellular matrix. Cell junctions. Cell-cell adhesion and cell communication. Extracellular cell-matrix adhesion. Structure and composition of the extracellular matrix of animal cells.
TOPIC 13. Cell signaling. General principles of cell signaling. Types of signage. Signaling molecules and their receptors. Signaling via protein-associated receptors G. Receptor tyrosine kinases. Signal transduction.
TOPIC 14. Cell cycle. Regulation of the cell cycle. Cell cycle control mechanisms. Cell death and apoptosis. Cell cycle disorders: cancer. Oncogenes and tumor suppressor genes.
TOPIC 15. Cell division. Mitosis. Phases of mitosis. Cytokinesis. Meiosis. Phases of meiosis.

LABORATORY PRACTICES
-Introduction to microscopy.
-Preparation and observation of cells (prokaryotic and eukaryotic) and tissues. Stains.
-Karyotype.
-Cell division.

This schedule is subject to any modifications that the teacher deems necessary.

EDUCATION ACTIVITIES

- In-person Activities:
AFP1. Theory classes. The contents of the course program will be developed, combining the teacher's master lessons, with the raising of questions and debates, making use of different teaching resources (presentations, videos, etc.)
AFP2. Practical classes. Some of the aspects discussed in the classroom sessions will be put into practice
AFP3. Exercise classes and problems. The exercises and problems posed during the theoretical classes will be solved and discussed.
AFP4. Seminars and/or exhibition of works. The students will give an oral presentation of their previously prepared works.
AFP5. Tutoring. The tutoring schedule can be consulted in coordination with the degree and will be informed by the teacher at the beginning of the course.
AFP6. Conducting exams.

- Non-Face-to-Face Activities/ Self-employment by the student:
AFNP1. Study of theory, exercises and problems.
AFNP2. Preparation and study of practices.
AFNP3. Preparation of works.
AFNP4. Tutoring preparation.

In addition to master classes, seminars, and tutoring, the student has the Virtual Classroom on the University's website, which is for restricted use, which will become a very useful tool for monitoring the subject and

communicating with the teacher.

DISTRIBUTION OF WORK TIME

TEACHER-LED TRAINING ACTIVITIES	INDIVIDUAL WORK
65 Horas	85 Horas

Cross Skills

To nurture an attitude of intellectual curiosity and a quest for truth in all areas of life.

To be able to approach a subject by means of rigorous, profound and comprehensive thought.

To be able to assess knowledge acquired.

To be able to apply the theoretical knowledge learnt in the of solving problems and practical cases linked to the various subjects.

LEARNING RESULTS

Estimate the biological risks associated with the use of substances and processes in the laboratories involved.

Develop skills to identify therapeutic targets and biotechnological drug production, as well as for the use of gene therapy.

SPECIFIC LEARNING RESULTS

Distinguish the various structures and properties of cells as well as the different types of organelles cellphones.

Identify the different phases of the cell cycle and the main cell signaling pathways

Describe the structure of the human genome

Interrelate the flow of genetic information and its regulation.

LEARNING APPRAISAL SYSTEM

Ordinary evaluation system, the evaluation of this subject, which will be carried out continuously throughout the course, will focus on the theoretical and practical knowledge that the student must have acquired and their reasoned assimilation to enable a correct interrelation and application of them. At the end of the academic period, a mandatory final test will be carried out whose passing (obtaining a grade equal to or greater than 5.0) is essential to pass the subject. The formative approach to evaluation aims to promote the active participation of the student throughout the teaching and learning process, so the evaluation of the student's learning will be carried out based on: SE1. Written tests (63%). IF 2. Daily activities and exercises (5%). IF 3. Individual and group work (15%). IF 4. Classroom attendance and participation (2%). SE8. Laboratory practices (15%). Laboratory Practices Assessment System: Attendance at practical sessions is mandatory. Failure to attend any of the sessions without justification implies the suspension of the practical part and, therefore, of the subject. To be able to average between the different parts, it is necessary to obtain a score in the exam equal to or greater than 5.0 points out of 10. The qualification of the practical part will be carried out as follows: - 25% Experimental work. - 25% Questionnaires on the theoretical content of the practices. - 50% Exam on the theoretical and practical content. To average the grades of the theoretical and practical part, a grade equal to or greater than 5.0 must be achieved in each of them. Obtaining a score of 5.0 or higher in the theoretical exam is mandatory in order to pass the subject and make an average grade with all the papers submitted during the continuous evaluation. If only the theoretical part or only the practical part is approved in the ordinary call, the approved grade will be saved for the extraordinary call, taking into account that the grade that will appear as obtained in this call will be the one that has been obtained in this call will be the one that has been found to be below 5.0. Alternative evaluation system, students who enroll for the second or more times in this subject, in the first few days of the course, should contact the teacher to find out about the evaluation criteria specific to their case. The evaluation rates in this case will be as follows: written tests (63%), exercises and activities requested by the teacher 22% and laboratory practices 15%. Plagiarism, as well as the use of illegitimate means in evaluation tests, will be sanctioned in accordance with those established in the Evaluation Regulations and the University's Coexistence Regulations.

ETHICAL AND RESPONSIBLE USE OF ARTIFICIAL INTELLIGENCE

1.- The use of any Artificial Intelligence (AI) system or service shall be determined by the lecturer, and may only be used in the manner and under the conditions indicated by them. In all cases, its use must comply with the following principles:
a) The use of AI systems or services must be accompanied by critical reflection on the part of the student regarding their impact and/or limitations in the development of the assigned task or project.
b) The selection of AI systems or services must be justified, explaining their advantages over other tools or methods of obtaining information. The chosen model and the version of AI used must be described in as much detail as possible.

c) The student must appropriately cite the use of AI systems or services, specifying the parts of the work where they were used and describing the creative process followed. The use of citation formats and usage examples may be consulted on the Library website(https://www.ufv.es/gestion-de-la-informacion_biblioteca/).
d) The results obtained through AI systems or services must always be verified. As the author, the student is responsible for their work and for the legitimacy of the sources used.
2.- In all cases, the use of AI systems or services must always respect the principles of responsible and ethical use upheld by the university, as outlined in the Guide for the Responsible Use of Artificial Intelligence in Studies at UFV. Additionally, the lecturer may request other types of individual commitments from the student when deemed necessary.
3.- Without prejudice to the above, in cases of doubt regarding the ethical and responsible use of any AI system or service, the lecturer may require an oral presentation of any assignment or partial submission. This oral evaluation shall take precedence over any other form of assessment outlined in the Teaching Guide. In this oral defense, the student must demonstrate knowledge of the subject, justify their decisions, and explain the development of their work.

BIBLIOGRAPHY AND OTHER RESOURCES

Basic

Bruce Alberts... [et al.]; with problems by John Wilson, Tim Hunt. Molecular biology of the cell/6th ed. New York: W.W. Norton & Company, 2015.

Additional

Bruce Alberts... [et al.]. Introduction to Cell Biology/3rd ed. Madrid: Editoria Médica Panamericana, 2012.