COURSE DATA

Data Subject	
Code	34697
Name	Biology
Cycle	Grade
ECTS Credits	6.0
Academic year	2022 - 2023

Study (s)

Degree	Center	Acad. year	Period
1206 - Degree in Dentistry	Faculty of Medicine and Odontology	1	First term

Subject-matter

Degree	Subject-matter	Character
1206 - Degree in Dentistry	2 - Biology	Basic Training

Coordination

Name	Department
MEGIAS VERICAT, FRANCISCO JAVIER	285 - Pathology
MORALES TATAY, JOSE MANUEL	285 - Pathology

SUMMARY

Biology is a semester-long core subject that is taught in the first course of dental studies. This subject is related to others of the degree of Dentistry such as: Biochemistry, Physiology, Histology and Pathological Anatomy. It is intended that the student deepens and broadens the study of the cell as a fundamental unit of living beings, where the unique vital functions are carried out and integrated and where the pathologies and the response of the living being to the aggressions of the environment. The mechanisms are studied basic genetics associated with cell dynamics and cytological concepts that lay the foundationsstructures of the cell and its processes of proliferation and differentiation, which will allow us to understand higher levels of organization of the human body. The scientific knowledge, skills and language acquired will provide the foundation essential to subsequently address the clinical teachings that a dentist must master.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

OUTCOMES

1206 - Degree in Dentistry

- Comprensión conceptual necesarias para el estudio de la célula como unidad fundamental de los seres vivos.
- Conocimiento de donde se llevan a cabo e integran las funciones celulares y donde se refleja la respuesta del ser vivo ante los estímulos ambientales.
- Conocimiento de los conceptos citológicos que sienten las bases estructurales de la célula y sus procesos de proliferación y diferenciación para hacer posible la comprensión y estudio del nivel tisular subsiguiente.
- Adquisición de las habilidades metodológicas para el uso del microscopio y diagnostico de estructuras celulares.
- Conocimiento de las tecnologías de la información y comunicación.
- Desarrollar la capacidad critica y autocrítica en el planteamiento y resolución de problemas siguiendo el método científico.
- Adquirir la formación básica para la actividad investigadora en el campo de la Biología Celular.
- Capacidad de trabajo en equipo y desarrollo de habilidades en las relaciones personales .

LEARNING OUTCOMES

1. Knowledge of the structure and function of eukaryotic cells as the fundamental unit of life and their integration at different levels of organization of living beings.
2. Knowledge of the morphological and functional aspects of cellular organelles and the relationships established between them to ensure proper overall functioning of the cell to detect abnormalities that lead to diseases.
3. Knowledge of the intracellular filaments that allow the maintenance of cell shape and structure and its changes during motility.

4. Knowledge of the processes of proliferation and differentiation, to make possible the understanding and subsequent study of the tissue level.
5. Knowledge of basic genetic mechanisms that ensure the proper maintenance of the structure and cellular functions.

6. Knowledge of the variation, modification and repair of genetic information, and levels of regulation of

its expression.
7. Conceptual understanding of the general principles underlying the inheritance.
8. Acquisition of methodological skills for the use of optical microscope and the diagnosis of cellular structures obtained by electron microscopy.
9. Identification of human chromosomes and their alterations.
10. Recognition by light and electron microscopy, different cell types and organelles, as well as the normal and abnormal karyotypes.

11. Management of databases of specific genes and the pathology associated with them.
12. Acquisition of basic training for research in the field of Cell Biology

DESCRIPTION OF CONTENTS

1. Theoretical lessons (1)

1. Introduction. Concept of living being. Functions of living beings. Structure of living beings: cellular and molecular level. Prokaryotic and eukaryotic cells.
2. Cell membrane: Morphology. Molecular organization. Fluidity of cell membrane lipids and proteins.
3. Cell membrane. Differentiations. Cell junctions.
4. Cell membrane: Adhesion molecules. Functions. Exocytosis and endocytosis. Receptor-mediated endocytosis.
5. Endoplasmic reticulum. Ultrastructure. Molecular organization. Functions.
6. Golgi apparatus. Morphology. Functions. Vesicular transport. Biogenesis.
7. Lysosome: Morphology. Functions. Biogenesis. Peroxisomes: Functions. Biogenesis.
8. Mitochondria. General characteristics. Ultrastructure. Functions. Biogenesis.
9. Cytoskeleton. Microtubules. Centrioles. Cilia and flagella. Molecular organization.
10. Cytoskeleton. Microfilaments. Contractile filaments. Intermediate filaments. Cytoskeleton functions.
11. The interphase nucleus. Ultrastructure. Nuclear envelope. Chromatin.
12. Nucleolus and ribosome: Structure. Function. Biogenesis.
13. General characteristics of chromosomes. Structure. Molecular organization. Chromosome cycle.
14. Cell division. General characteristics of mitosis. Methods of study. Phases of mitosis.
15. Cell division. Meiosis. Biological cycles. Phases of meiosis. Genetic consequences of meiosis. Comparison between mitosis and meiosis.

2. Theoretical lessons (2)

16. Cell cycle. Phases. Control of cell cycle.
17. The genome of living beings. General characteristics of procaryote and eukaryote genomes.
18. Regulation of gene expression.
19. Genetic variation. Mutation. Repair of genetic material.
20. Mendelian genetics. Historical introduction. Mendel's laws. Chromosome theory of heredity. Linkage and recombination.
21. Monogenic diseases. Autosomal transmission patterns. Autosomal dominant inheritance. Autosomal recessive inheritance.
22. X-linked inheritance. X-chromosome inactivation. Disease X-linked recessive.

23. Monogenetic diseases. Changes in transmission patterns. Modifying factors.
24. Study of the human karyotype. Determining the number of chromosomes. Methodology.
25. Medical cytogenetics. Numerical chromosomal abnormalities. Clinical phenotypes.
26. Medical cytogenetics. Structural chromosomal abnormalities. Deletion. Duplication. Isochromosome. Dicentric chromosomes. Inversion. Chromosomal translocation.
27. Cell aging and cell death. Hayflick experiments. Apoptosis and necrosis. Morphology. Molecular basis.
28. Gametogenesis. Spermatogenesis. Morphology and Phases.
29. Oogenesis. Phases.
30. Fertilization. Characteristics of egg and sperm. Activation of the egg. Amphimixis. Anomalies of fertilization.

3. Practical lessons

PRACTICAL SESSIONS

1. Use of the optical microscope and multimedia devices.
2. Cytochemical techniques.
3. Cell types
4. Cell culture.
5. Cell division.
6. Gametogenesis

4. Thematic and iconographic seminars

1. Techniques of adaptation of biological material for its observation under the optical and electronic microscope.
2. Coloring techniques.
3. Recognition of subcellular structures (electron microscopy).
4. Cell cultures.
5. Interpretation of genealogical trees (autosomal, X-linked and mitochondrial inheritance). Mendelian Genetics problem solving.
6. Chromosomal formulation. Study of chromosomal pathologies.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	33,00	100
Classroom practices	15,00	100
Laboratory practices	12,00	100
Development of individual work	15,00	0
Study and independent work	50,00	0
Readings supplementary material	5,00	0
Preparing lectures	9,00	0
Preparation of practical classes and problem	9,00	0
Resolution of case studies	2,00	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

The face-to-face teaching of the subject will be carried out through theoretical classes (50%) and practical classes (50%). 30 hours of theoretical classes will be taught in which the teacher will expose the necessary contents so that the student acquires the basic knowledge that the subject foresees.

The practical classes (27 hours) are divided into Laboratory Practices (6 sessions of 2 hours) that will be carried out in the microscope room, in which the student will be able to analyze preparations and images in accordance with the objectives of the subject. The student will also receive a seminar (6 sessions) on different contents of the subject in which he will participate more actively. The realization of practices and seminars will be completed with the use of interactive resources, multimedia content, audiovisual material and computer applications. The student will prepare a notebook where the continuous and progressive work of their observations made during the practical classes is reflected, as well as the interpretation of the microscopic structures analyzed during them.

EVALUATION

The evaluation of the students' learning will be based on the assessment of the theoretical and practical contents of the subject.**Evaluation of the theoretical part**: the students will carry out a written exercise at the end of the teaching of the subject; the assessment obtained in this section will constitute 70% of the final grade.The theoretical exam will consist of 14 questions of limited length, which will be valued from 0 to 0.5 points per question. **Evaluation of the practical lessons:** a final written test will be carried out, in which the skills and abilities obtained during the practical teaching will be evaluated. The student will have to recognize microscopic preparations, interpret electron microscopy images and solve problems.A continuous evaluation will also be carried out, attendance and work done during the course will be assessed through the exercises programmed in it. The assessment obtained in the practical section will constitute 30% of the final grade. To pass the course, it will be essential to pass both the theory and the practical exams.

Students are reminded of the great importance of carrying out evaluation surveys of all the teaching teachers of this subject.

REFERENCES

Basic

- Alberts, Johnson, Lewis, Raff, Roberts, Walter. Molecular Biology of the cell. Biología Molecular de la Célula. Garland Science NY, 6ª edición (2014)
- Thompson & Thompson. Genética en Medicina. Ed. Elsevier Masson, 8ª edición (2016)
- Calvo, Alfonso. Biología Celular Biomédica. Editorial Elsevier, 2015

Additional

- Jorde, Carey, Bamshad. Genética Médica. Ed. Elsevier, 4ª edición.
- Emery. Elementos de Genética Médica. Editorial Elsevier, 15ª edición.