COURSE DATA

DATA SUBJECT

Code: 34697
Name: Biology
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
1206 - Degree in Dentistry	Facultat de Medicina i Odontologia	1	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1206 - Degree in Dentistry	Biology	BASIC

COORDINATION

SAN MIGUEL DIEZ TERESA CONSUELO

SUMMARY

Biology is a semester-long basic training course taught in the first year of Dentistry studies. This course is related to other Dentistry degree courses such as Biochemistry, Physiology, Histology, and Pathological Anatomy.

The course aims to deepen and broaden the study of the cell as the fundamental unit of living beings, where unique vital functions are carried out and integrated, and where pathologies and the living being's response to environmental aggressions are reflected. The course covers the basic genetic mechanisms associated with cellular dynamics and the cytological concepts that underlie the structural foundations of the cell and its proliferation and differentiation processes, which will allow for an understanding of the higher levels of organization in the human body.

The knowledge, skills, and scientific language acquired will provide the essential foundation for later addressing 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

COMPETENCES / LEARNING OUTCOMES

-

Adquirir la formación básica para la actividad investigadora en el campo de la Biología Celular.

Adquisición de las habilidades metodológicas para el uso del microscopio y diagnostico de estructuras celulares.

Capacidad de trabajo en equipo y desarrollo de habilidades en las relaciones personales .

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 las tecnologías de la información y comunicación.

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.

Desarrollar la capacidad critica y autocrítica en el planteamiento y resolución de problemas siguiendo el método científico.

DESCRIPTION OF CONTENTS

Theoretical lessons

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 I. Ultrastructure. Nuclear envelope. Chromatin.

12. The interphase nucleus II. 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.

16. Mendelian genetics. Historical introduction. Mendel's laws. Chromosome theory of heredity. Linkage and recombination.

15. Cell division. Meiosis. Biological cycles. Phases of meiosis. Genetic consequences of meiosis. Comparison between mitosis and meiosis.

17. Monogenic diseases. Autosomal transmission patterns. Autosomal dominant inheritance. Autosomal recessive inheritance

18. X-linked inheritance. X-chromosome inactivation. Disease X-linked recessive.

19. Monogenetic diseases. Changes in transmission patterns. Modifying factors.

20. Study of the human karyotype. Determining the number of chromosomes. Methodology.

21. Medical cytogenetics. Numerical chromosomal abnormalities. Clinical phenotypes.

22. Medical cytogenetics. Structural chromosomal abnormalities. Deletion. Duplication. Isochromosome. Dicentric chromosomes. Inversion. Chromosomal translocation.

23. The genome of living beings. General characteristics of the human genome. Comparative genomics.

24. Regulation of gene expression.

25. Genetic variation. Mutation. Repair of genetic material

26. Cell cycle. Phases. Control of cell cycle.

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

Practical lessons

Laboratory

1. Use of the optical microscope and multimedia devices.

2. Staining.

3. Cell types.

4. Cell cultures.

5. Cell division.

6. Gametogenesis.

Thematic and iconographic seminars

1. Techniques for preparing biological material for observation under light and electron microscopes.

2. Staining and cytochemical techniques.

3. Recognition of subcellular structures.

4. Stem cells.

5. Interpretation of family trees. Solving genetics problems.

6. Chromosomal formulation. Study of chromosomal pathologies.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	33,00
Laboratory	12,00
Classroom practices	15,00
Total hours	**60,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	15,00
Independent study and work	55,00
Preparation of lessons	18,00
Preparation for assessment activities	0,00
Resolution of case studies	2,00
Total hours	**90,00**

TEACHING METHODOLOGY

The on-site teaching of the subject will be conducted through theoretical classes (50%) and

practical classes (50%). Thirty hours of theoretical classes will be taught along with the corresponding hours of evaluation, during which the professor will delve into the necessary content for the student to acquire the basic knowledge, competencies, and skills expected in the subject.

The practical classes (27 hours) are divided into Laboratory Practices in the microscopy room and Iconographic Seminar-Practices in the classroom. In these, the student will be able to analyze preparations and images according to the course objectives, work on competencies by actively participating, and begin to tackle some of the research problems in Cell Biology.

The practical sessions and seminars will be complemented with the use of interactive resources, multimedia content, audiovisual material, and computer applications. The student will produce a notebook reflecting their continuous and progressive work on the observations made during the practical classes, as well as the interpretation of the microscopic structures analyzed.

The teaching will incorporate a gender perspective, respect for diversity, and the Sustainable Development Goals (SDGs), whenever possible.

EVALUATION

The evaluation of students' learning will be based on the assessment of the theoretical and practical contents of the subject.

Theoretical evaluation: students will take a written exam at the end of the course; the grade obtained in this section will account for 70% of the final mark. The theoretical exam will consist of 7 short-answer or varied-format questions, each graded from 0 to 0.5 points (3.5 points in total), 10 true/false questions with reasoning, each worth 0.05 points for the correct answer and justification (0.5 points in total), and 20 multiple-choice questions with only one correct option, each worth 0.15 points and with a deduction of 0.05 points for incorrect answers (3 points in total).

Practical evaluation: a final written test will be carried out to evaluate the skills and abilities acquired during practical teaching. The student must identify microscopic preparations, interpret electron microscopy images (10%), and solve problems and questions based on seminars (10%). Both of these tests will make up the practical section and account for 20% of the final mark.

Continuous assessment will also be carried out and the work completed throughout the course will be evaluated through the exercises scheduled. The grade obtained in this section will account for 10% of the final mark.

To pass the subject, it will be essential to pass both the theoretical and the practical exams. Attendance at practical activities is mandatory. A student will be considered to have met this

requirement if they have attended at least 80% of these activities and have adequately justified the impossibility of attending the remaining sessions due to force majeure. Compliance with this requirement is essential for passing the subject.

Students are reminded of the importance of completing the evaluation surveys for all the teaching staff of the degree program.

REFERENCES

BÁSICAS

- Alberts, J., Heald, R., Johnson, A., et al. Molecular Biology of the Cell. Norton & Company, 7ª edición. 2022.
- Alberts, J., Lewis, R., Roberts, W. Biología molecular de la célula. Ed. Omega, 6ª edición. 2016.
- Calvo, A. Biología Celular Biomédica, 2ª edición. Elselvier. 2023.
- Cohn, R., Scherer, S., Hamosh, A. Thompson and Thompson. Genetics and Genomics in Medicine. 9ª edición. 2023.
- Nussbaum, R.L. Thompson & Thompson. Genética en Medicina. Ed. Masson. 8ª edición. 2016.

RECURSOS e-Salut:

- ClinicalKey Student Medicina, Odontología y Enfermería [https://uv-es.libguides.com/RecursosSalut]
- Acces Medicina [https://uv-es.libguides.com/Access_Medicina]
- Médica Panamericana [https://uv-es.libguides.com/Medica_Panamericana]

ADDITIONAL

- Jorde, L.B., Carey J.C., Bamshad, M.J. Genética Médica. Ed. Elsevier. 6ª edición. 2020.
- Turnpenny, P.D., Ellard, S., Cleaver R. Emery. Elementos de Genética Médica y Genómica. 16ª edición. 2022.