



**“CAROL DAVILA” UNIVERSITY
OF MEDICINE AND PHARMACY BUCHAREST**
Faculty of Dentistry
Dental Medicine in English



DISCIPLINE GRID

1. Programme:

1.1.	CAROL DAVILA UNIVERSITY OF MEDICINE AND PHARMACY BUCHAREST
1.2.	FACULTY OF DENTISTRY /2nd DEPARTMENT
1.3.	DIVISION: HISTOLOGY
1.4.	STUDY DOMAIN: Health, sectoral regulated within European Union
1.5.	STUDY LEVEL: LICENCE
1.6.	STUDY PROGRAMME: DENTAL MEDICINE IN ENGLISH

2. Discipline:

2.1.	DISCIPLINE NAME: Cell and Molecular Biology						
2.2.	LOCATION: Faculty of Medicine, Eroilor Sanitari Blvd., 1st Floor						
2.3.	Lectures tenure: Assoc.Prof. Mihnea-Ioan NICOLESCU (MD, DMD, PhD)						
2.4.	Practical classes tenure: Assoc. Prof. Mihnea-Ioan NICOLESCU (MD, DMD, PhD) Assistant Prof. Iulia ROATEȘI (DMD, PhD) Assistant Prof. David REMBAS (MD, PhD student)						
2.5.	I	2.6.	I	2.7.	Written/Oral Examination	2.8. Type of discipline	CD / FD
Study year		Semester		Evaluation			

3. Estimated total time (hours/semester)

No. hours/week	2	out of which	Lectures: 1	Laboratory session: 1
Total hours out of learning schedule	28	out of which	Lectures: 14	Laboratory sessions: 14

Time distribution	hours
Textbook study, lecture support, bibliography and notes	14
Supplementary documentation activity in the library, on online platforms	2
Practical activity support material, homework, portfolio and essays	2
Tutorial activity	1
Examinations	2
Other activities	1
Total hours of individual study	22
Total hours per semester	50
Credits	2

4. Preconditions

4.1. curriculum	basic biology notions (the composition and fundamental functions of the human body)
4.2. proficiencies	-

5. Conditions

5.1. for lecture activity	Amphitheater (capacity: minimum 120 seats), with audio-video system (microphone, amplification station, speakers, video projector with laptop connection possibility, projection screen) and internet access (WiFi, secured)
5.2. for laboratory activity	<ul style="list-style-type: none"> - Laboratory of histological technology for obtaining permanent microscopic preparations, equipped with specific apparatus for fixing, dehydrating, including, sectioning, staining, mounting, labelling and accessories, including but not limited to: microscopes with various objective lenses, histological processing unit, staining battery of histological preparations, microtome for paraffin, temperature-adjustable thermostat, refrigerator-freezer, histological collection, instruments, reagents, glassware and necessary consumables - Capture and broadcast system from the light microscope - Didactic microscopy slides - Electron micrographs - Multimedia interactive platform

6. Accumulated skills

6.1. Proficiencies <i>(knowledge and abilities)</i>	<p>I. Knowledge (cognitive dimension)</p> <ul style="list-style-type: none"> - Notions of cell and molecular biology and cytology (knowledge of the structure and functions of different cells in the human body) <p>II. Abilities (functional dimension)</p> <ul style="list-style-type: none"> - Ability to use the light microscope correctly for the examination of permanent microscopic preparations - Ability to recognize and distinguish the fundamental characteristics of cells by examining under light microscopy and/or electron micrographs
6.2. Transversal skills <i>(role, professional and personal development)</i>	<p>III. Role skills</p> <ul style="list-style-type: none"> - Development of the capacity to analyze, synthesize and use appropriately and coherently the acquired knowledge - Critical analysis and communication in specific medical language of some concepts, hypotheses, or scientific results - Development of evaluation and self-evaluation capacity <p>IV. Professional and personal development skills</p> <ul style="list-style-type: none"> - Awareness of the need for continuing education through translational education - Training students to learn to work in teams to solve problems - Development of students' ability to identify valid bibliographic sources and the formation of skills for their correct and efficient use in carrying out scientific papers (poster, article, presentation) - Training students' research skills

7. Objectives (based on the grid of acquired specific skills)

7.1. General Objective	<ul style="list-style-type: none"> - Knowledge of the microscopic organization of cells, tissues and organs in the human body. - Students' understanding of the molecular basis and the relationship between the structure and ultrastructure of cells and their function in tissues and organs as a basic element for the approach and subsequent understanding of histology and histopathology. - Highlighting the correlation between microscopic structure and cell functions as components of tissues and organs, at the level of optical and electron microscopy.
7.2. Specific Objectives	<ul style="list-style-type: none"> - Development of practical examination skills under the light microscope, proper understanding of use of instruments and equipment specific to the histology laboratory and familiarization of students with modern technologies for tissue processing and examination: electron microscopy, cell cultures, immunohistochemistry etc. - Development of students' ability to recognize the fundamental characteristics of cells, as constituent elements of tissues and organs by examination under a light microscope and by the study of electron micrographs. - Training the ability to use specialized terminology appropriately. - Establishing correlations with future clinical activities in the dental practice.

8. Content

8.1. Lectures	No. hrs/topic	Teaching method	Obs.
1. Introduction to the study of cell and molecular biology. Cell: definition, general properties. Classification (prokaryotic and eukaryotic cells).	1	Interactive presentations according to the syllabus, using multimedia and instructional videos	-
2. Molecules found in living cells. The chemical organization of the cell and its biological significance. Morphological and functional organization of the human eukaryotic cell.	1		
3. Cell membrane. Definition, ultrastructural organization, functions. Molecular organization of the cell membrane. Chemical composition of the membrane.	1		
4. Membrane transport and cell signaling. Transport of ions and small molecules; transport of macromolecules and particles (endocytosis, exocytosis). Transduction pathways. Receptors and ligands. Information transmission using signaling molecules.	1		
5. Organelles that produce energy. Mitochondria.	1		
6. Organelles involved in cell synthesis and secretion. Ribosomes, smooth and rough endoplasmic reticulum, Golgi apparatus.	1		
7. Organelles involved in cell digestion. Lysosomes, proteasomes, peroxysomes.	1		
8. Cytoskeleton. Actin filaments (microfilaments), intermediate filaments, microtubules	1		
9. Cell surface specializations. Microvilli, cilia, flagella.	1		
10. Intercellular junctions. Tight junctions (Zonula Occludens). Adhesive junctions (Macula Adherens, Zonula Adherens, hemidesmosomes). Communication junctions (GAP).	1		
11. The cell nucleus. Nuclear envelope, nuclear matrix, chromatin, nucleolus.	1		
12. Cell division. Cell cycle: stages, restriction points, regulatory factors. Mitosis. Meiosis.	1		
13. Cell death. Apoptosis.	1		
14. Cancer biology. Cell and molecular biology of cancer cells. Molecular biology-based cancer therapies.	1		

8.2. Laboratory Sessions	No. hrs/topic	Teaching method	Obs.
1. Microscopy - introductory notions. Light microscopy. Operating principles, types of light microscopes.	1	- interactive slide shows and instructional videos - practical demonstrations - examination of slides under light microscopy - study of electron micrographs - exercises based on accumulated practical knowledge	-
2. Electron microscopy (EM). Operating principles, types of electron microscopes.	1		
3. The technique of obtaining the preparation for light microscopy. The stages of obtaining the permanent microscopic preparation. Principles of histochemistry and immunohistochemistry.	1		
4. Staining methods. Regular staining methods. Specific stains.	1		
5. The technique of obtaining the preparation for electron microscopy. The stages of obtaining the microscopic preparation for transmission and scanning electron microscopy.	1		
6. How to read electron microscopy images. The appearance of cells, nucleus, and cell organelles in electron micrographs.	1		
7. Practical notions of operating the conventional light microscope. Rules of examination under light microscope.	1		
8. Analyzing slides under light microscopy. Appearance of cells, nuclei and cellular organelles under the light microscope.	1		
9. Cell membrane. Appearance under the electron microscope of cell membrane, intercellular junctions and cell surface specializations (microvilli, cilia, flagella).	1		
10. Cell division. Phases of mitosis and their particular features.	1		
11. Recapitulation of practical notions. Examination of histological slides under light microscopy. Examination of normal/colorized electron micrographs. Basic morphometry notions.	2		
12. Viva voce / Practical assessment	2	Verification of notions and skills accumulated in practical work	-

8.3. Bibliography for lectures and laboratory/practical sessions
<ol style="list-style-type: none"> 1. Lectures and practical sessions explanations (digital versions available via e-learning platform) 2. Alberts B et al. Essential Cell Biology. 5th ed. Garland Science, 2019. 3. Gromley Z and Gromley A. Biochemistry, Cell and Molecular Biology, and Genetics: An Integrated Textbook. 1st ed. Thieme, 2021. 4. Mescher AL. Junqueira's Basic Histology, Text & Atlas. 13th ed., McGrawHill/Lange, 2013. 5. Pawlina W. Ross's Histology, a Text and Atlas. 7th ed., Wolters Kluwer, 2015. 6. Whawell SA, Lambert DW. Basic Sciences for Dental Students. 1st ed. Wiley Blackwell, 2018. <p><i>Scientific journals (supplemental):</i></p> <ol style="list-style-type: none"> 7. Biochemistry and Molecular Biology Education (ISSN: 1539-3429) 8. Cell (ISSN: 1097-4172) 9. Cell Tissues Organs (ISSN 1422-642) 10. Journal of Cellular and Molecular Medicine (ISSN: 1582-4934)

9. Corroborating the contents of the discipline with the expectations of epistemic community representatives, professional associations and employers in the fields representative for the program

Professional training of students for future years of practice, acquiring the basic notions of structural and ultrastructural architecture of cells, as individual units as well as part of tissues and organs. The use of scientific principles as tools for development of critical analytical thinking.
Translational education through the pedagogical interpretation of scientific results in areas of interest.

10. Evaluation

10.1 Evaluation			
Activity type	Evaluation Criteria	Methods of evaluation	% out of final grade
Lecture	A. Knowledge for mark 5: - basic knowledge of cell structure and functional organization - basic general data of the knowledge gained during the semester. B. Additional knowledge for mark 10 - in-depth knowledge of structure and functional cell organization - presentation of morphological details, understanding the relationship between microscopic structure and cell functions	Continuous assessment Student's activity during the semester (attendance, answers etc.)	10%
		Final exam Theoretical exam consisting of a test with questions covering the entire semester syllabus.	70%
Laboratory Sessions	A. Knowledge for mark 5: - basic practical knowledge of histology from the syllabus - ability to recognize cells and their components without presenting morphological details. B. Additional knowledge for mark 10: - ability to recognize and describe the normal structure of cells and their components, to accurately differentiate subcellular structures, the presentation of morphological details, to make correlations and interpretations.	Viva voce / Practical assessment - direct examination of a histological slide under a light microscope to verify the practical knowledge acquired by the student, - examination of electron micrographs to assess the student's ability to recognize and distinguish the various cellular components	20%
		Minimum performance standards	
Elementary knowledge of the microscopic structure of cells; correct use of the light microscope; identification of various cellular components by examining electron micrographs.			

Date:
June 23, 2023

Chair of Histology Division / Lectures tenure:
Assoc. Prof. Dr. Mihnea-Ioan Nicolescu

Date of the approval in Department Board:

Department director,
Prof. Dr. Alexandru Bucur