General information		
Academic subject	**Cytology and Histology**	
Degree course	Biological Sciences	
Academic Year	2021/2022	
European Credit Transfer and Accumulation System (ECTS)		8
Language	Italian	
Academic calendar (starting and ending date)		18/10/2021 – 28/01/2022
Attendance	Yes	

Professor/ Lecturer	
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Virtual headquarters	
Tutoring (time and day)	Monday 9-11; Friday 11-13. It is advisable to contact the teacher by e-mail

Syllabus	
Learning Objectives	Basic knowledge on composition of living matter, microscopes and main techniques used for the morphological study of cells and tissues, cell structure, main functions performed by cellular organelles, cell division processes, organization of animal tissues.
Course prerequisites	Secondary school knowledge of cell biology and tissues
Contents	**Cytology**: The cell theory. Eukaryotic and Prokaryotic cell. Light and electronic microscopes. Shape and dimensions of the cells. Viruses: reproduction and life cycle General organization of the cell. Covalent bonds and interactions. Polar and non-polar molecules. Water properties. Macromolecules: carbohydrates, lipids proteins and nucleic acids. Transcription: major steps, regulation and functions mRNA, tRNA and rRNA. Protein synthesis. DNA structure and replication mechanism. Plasma membrane structure and function. Membrane transport across the membranes: diffusion and active transport. Endo-esocytosis and caveolae. The glycocalyx. The rough endoplasmic reticulum. The ribosomes. The smooth endoplasmic reticulum. The Golgi complex and co- and post-translational modifications. N- and O-glycosylation. Sorting of proteins in different cell compartments. Vesicular trafficking. The lysosomes and. peroxisomes. The mitochondria. general structure and function. ATP, metabolism, and oxidative phosphorylation. Cytoskeleton: microfilaments, intermediate filaments, and microtubules. Structure and function. Cilia and flagella. The motor proteins: myosin, dynein, kinesin and the related mechanisms. Cell junctions: tight junctions, adhaerens junctions, desmosomes, hemidesmosomes, gap junctions. The nucleus. The nuclear envelope. The nuclear matrix. The chromatin. The nucleolus. The cell division cycle. The chromosomes. Centrioles and spindle apparatus. Mitotic and meiotic division. The cell differentiation. **Histology**: Epithelia classification: Lining (Simple, Stratified, Transitional and Pseudostratified), Glandular (exocrine, endocrine, development morphology, secretion mode. hormone acting) and sensory epithelia. Tissues cartilage (hyaline, elastic, fibrous and articular) and bone (compact and spongy bone). Direct and indirect ossification. Blood: erythrocytes, leukocytes, blood platelets antibody responses and cell-mediated immune responses Haematopoiesis and general

	characteristics of lymphatic system. Organization of the skeletal muscle. Myofibrils. Actin and myosin. The sarcoplasmic reticulum. Muscular contraction. Smooth muscular tissue. Cardiac muscular tissue. Nervous tissue. Neurons and glial cells (forms and varieties of neurons). The nerve fibres and the myelin sheath. Conduction and transmission of the nerve impulse. Neuroglia. Laboratory: Use of microscopes and main histological techniques. Cell and tissue recognition. Interpretation of ultrastructural images.
Books and bibliography	- *Citologia e istologia – Isabella Dalle Donne - EdiSES* - *Istologia ed elementi di anatomia microscopica- Dalle Donne-EdiSES*
Additional materials	

Work schedule			
Total	Lectures	Hands on (Laboratory, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
Hours			
200	60	6	134
ECTS			
8	7,5	0,5	
Teaching strategy			
Expected learning outcomes			

Knowledge and understanding on:	The aim of the course is to provide adequate knowledge
	  o The composition of living matter,
	  o morphology and structure of the cell,
	  o main functions performed by cellular organelles,
	  o cell division processes,
	  o tissue organization

Applying knowledge and understanding on:	Through the activities in the laboratory students will develop applied skills:
	  o Using microscopes
	  o Knowledge of the main techniques applied for the morphological study of cells and tissues.

Soft skills	• *Making informed judgments and choices*
	  o Students acquire autonomy in the identification of different tissues
	  o in the recognition of the micro-anatomy of the various organs,
	  o in the ultrastructural recognition of the cellular component.
	• *Communicating knowledge and understanding*
	  o The student must be able to express himself competently on issues related to the study of cells and tissues, also demonstrating good communication skills.
	• *Capacities to continue learning*
	  o The student must be able to relate competently with a morpho-functional approach to the study of animal cells and tissues.

Assessment and feedback	
Methods of assessment	
Evaluation criteria	• *Knowledge and understanding* o At the end of the course the student should demonstrate good knowledge about each topic. Memorizing without understanding

	is meaningless.
	• *Applying knowledge and understanding*
	    ○ Appropriate language and description apart, the student must demonstrate knowledge of the morpho-functional, evolutionary and adaptive implications of the structures and processes studied.
	• *Autonomy of judgment*
	    ○ Acquire a property of language, and a scientifically correct expressive capacity related to the topics of the course.
	• *Communication skills*
	    ○ Students should use technical terminology in describing processes and cellular structures, explaining their meaning if necessary.
	    ○ The exhibition can be optionally accompanied by the simple drawings making during the exam.
	• *Capacities to continue learning*
	    ○ Although the suggested textbooks cover the main topics, research is always in progress so some updates will be given during the lessons. The ability of students to integrate these contents with those from the textbooks will be evaluated

Criteria for assessment and attribution of the final mark	The final vote is awarded based on the level of articulation of the response and the student's ability to demonstrate mastery of the topic with expository clarity, with specific and appropriate scientific terminology and on the ability to link different topics of the program. The final grade will be awarded in thirtieths. The exam is considered passed when the mark is greater than or equal to 18.
Additional information	