

# Human Anatomy [ 1207105 ]

Offerta didattica a.a. 2024/2025

**Docenti:** SIMONE CAROTTI

**Periodo:** Ciclo Annuale Unico

## Obiettivi formativi

The course aims to provide students with fundamental knowledge, both macroscopic and microscopic, regarding the organs of the various systems that constitute the human body. Particular emphasis will be placed on understanding the morpho-functional organization of the stomatognathic system, including topographical, functional, and clinical relationships, as well as the study of anatomical structures of odontostomatological interest present in the head and neck.

## Prerequisiti

No prerequisites are mandatory, but it is preferable to have knowledge of General and Applied Biology, as well as Histology and Embryology.

## Contenuti del corso

First semester of teaching:

Principles of general anatomy. Body planning. Criteria for the construction of the human body: external forms and surface anatomy.

Musculoskeletal system: general concepts, osteology, myology, and arthrology of the trunk and limbs.

Thoracic and abdominopelvic cavities.

Circulatory system: heart and pericardium, arteries, veins, lymphatic vessels of the trunk and limbs; blood and lymph; spleen, thymus, and lymph nodes.

Respiratory system: lower airways (trachea, bronchi, lungs, pleurae).

Digestive system: alimentary canal and associated glands, liver, and pancreas.

Urinary system: kidneys and urinary tract.

Male genital system: testicles, spermatic ducts, external genitalia.

Female genital system: ovaries, genital ducts, external genitalia.

Integumentary system.

Second semester of teaching:

Special anatomy of the head and neck region:

General organization of the nervous system: CNS, PNS, ANS

Sense organs

Endocrine system.

Topographic anatomy of the head and neck region. Skull bones with particular reference to the maxilla and mandible; paranasal sinuses; cranial fossae, temporal fossa, infratemporal fossa, pterygopalatine fossa, boundaries, and contents; temporomandibular joint. Attachments and functions of the facial muscles, masticatory muscles, suprahyoid muscles, infrahyoid muscles, neck muscles. Arterial, venous, and lymphatic vessels of the head and neck, particularly of the facial skeleton. Main lymph node stations of the head and neck.

Stomatognathic system: oral cavity, dental arches, tongue, major salivary glands: vascularization and innervation.

## Metodi didattici

Lectures and interactive practical sessions in clinical anatomy, macroscopic anatomy (models, isolated organs, virtual dissection table, anatomical dissection videos and discussion, use of intraoral scanners), and microscopic anatomy (microscopic observation of specimens, discussion of digital histological slides).

## Modalità di verifica dell'apprendimento

The exam will take place at the end of the course, during the sessions scheduled in the academic calendar. At the end of each semester, students can take an interview, which counts as credit towards the final exam, covering the material studied during that semester. At the end of the first semester, students may take a written interview, which can be supplemented by an oral exam, requiring the recognition of bone segment models with descriptions of the main related joint and muscular compartments, as well as descriptions of the main body regions and cavities

including the organ systems they contain. Students will be expected to understand the main aspects of the microscopic and macroscopic structures of the different systems and discuss their main anatomical-clinical correlations. At the end of the second semester, students will take a final written interview, which can also be supplemented by an oral exam, in which they must recognize the morphological and structural aspects of the central and peripheral nervous systems, the endocrine system, the stomatognathic system, and the head and neck region in general, along with their main anatomical-clinical correlations. The final exam, if the intermediate tests at the end of each semester were not taken, will consist of a comprehensive exam that includes all the tests described above. The final evaluation will also consider the results of any assessments of the individual modules. The evaluation criteria for content assessment will include accuracy, completeness, clarity of exposition; the ability to recognize and describe images of macro and microscopic structures; the ability to describe organs and body regions; and the ability to identify the main morphological and structural elements of anatomical-clinical relevance. The exam will be considered passed if the student can answer at least satisfactorily to all questions. The grade awarded will depend on the depth of topic understanding, the propriety of language, and the logical-critical skills demonstrated in recognizing and describing the microscopic and macroscopic structures of organs, systems, and anatomical regions along with their fundamental functional and clinical correlations.

The assessment of learning will result in a final grade expressed out of thirty. Specifically, the grade will fall within the following ranges based on the learning parameters considered:

- 18-23: Sufficient knowledge of the topics, modest language proficiency, modest/poor logical-critical ability in recognizing and describing structures and their functional and clinical correlations.
- 24-27: Sufficient/good knowledge of the topics, modest/good language proficiency, modest/good logical-critical ability in recognizing and describing structures and their functional and clinical correlations.
- 28-30: Excellent knowledge of the topics, excellent language proficiency, excellent logical-critical ability in recognizing and describing structures and their functional and clinical correlations.
- 30L: Outstanding knowledge of the topics, outstanding language proficiency, outstanding logical-critical ability in recognizing and describing structures and their functional and clinical correlations.

### **Testi di riferimento**

The main recommended textbooks are:

Autori vari, Trattato di Anatomia Umana, Edi-Ermes.

Gaudio, Carpino, Franchitto, Morini, Onori. Sistema nervoso centrale. Piccin, 2011.

Autori vari, Anatomia del Gray – Le basi anatomiche della pratica clinica, EDRA Elsevier.

Autori vari, Prometheus - Atlante di Anatomia, Edizione italiana a cura di E. Gaudio. EdiSES.

Netter, Atlante di anatomia umana, Elsevier.

AAVV, Guida alla lettura dell'atlante di Anatomia Umana di Frank Netter, Elsevier, 2014.

Anatomy for dental medicine – 3rd edition – Edited by Baker

Netter's head and neck anatomy for dentistry - 3rd edition – Elsevier

Other texts:

Autori vari, Prometheus – Testo Atlante di Anatomia (3 volumi), Edizione italiana a cura di E. Gaudio. EdiSES, 2014.

Sobotta, Atlante di anatomia, Elsevier, 2009.

Anastasi, Tacchetti, Anatomia Umana – Atlante, Edi-Ermes, 2013. Autori vari, Gray – Atlante fotografico di dissezione, EDRA, 2013.

Autori vari, Istituzioni di Anatomia dell'Uomo, Testo/Atlante fondato da Giulio Chiarugi, 5 volumi, Piccin, 2019.

Marinozzi, Gaudio, Ripani, Anatomia clinica, Ed. Delfino, 2017.

Familiari, Anatomia microscopica - Atlante di microscopia ottica ed elettronica, Piccin, 2017. Rohen, Yokochi, Atlante di Anatomia Umana, Edizione italiana a cura di A. Franchitto, Piccin, 2010. Kahle, Frotscher, Anatomia Umana. Atlante tascabile, 3 volumi, CEA, 2016.

Sadler, Embriologia medica di Langman, EDRA-Masson, 2016.

AAVV. Anatomia Umana. Raccolta di quesiti a risposta multipla per la verifica e l'autoverifica degli apprendimenti, SSD BIO-16. EdiSES, 2018.

A.D.A.M. (Animated Dissection of Anatomy for Medicine) Software, Inc., Atlanta, Georgia USA.

Visible Body - Atlante di Anatomia Umana in 3D accessibile su piattaforma Ovid tramite Biblioteca UCBM.

### **Altre informazioni**

Knowledge and understanding

The student will need to acquire a thorough knowledge and understanding of the structural organization of the human body across various stages of life, from organogenesis to the different phases of adult development.

Particular emphasis will be placed on the morphology and structure of the body, with a special focus on the stomatognathic system and the head and neck region, according to topographic, macroscopic, microscopic, and ultrastructural anatomy. The primary objective of the course is to understand the essential aspects that link anatomy to the function of organs and systems, as well as to clinical practice, with a special focus on the stomatognathic system and the head and neck region.

Applying knowledge and understanding

By the end of the course, the student will be able to describe the structural organization of the human body throughout various stages of life, from organogenesis to the different phases of development, at the anatomical-topographical, macroscopic, microscopic, and ultrastructural levels. The student will also be able to correlate the structural organization with the corresponding functions of systems, organs, and tissues, and understand the main morpho-functional, anatomical-topographical, anatomical-radiological, anatomical-clinical, and

applicative correlations related to the field of dentistry, with a particular focus on the stomatognathic system and the head and neck region. The student will be able to identify macroscopic human anatomy preparations and possess general criteria for interpreting microscopic preparations.

**L'attività didattica è offerta in:**

**Facoltà Dipartimentale di Medicina e Chirurgia**

<b>Tipo corso</b>	<b>Corso di studio (Ordinamento)</b>	<b>Percorso</b>	<b>Crediti</b>	<b>S.S.D.</b>
Laurea Magistrale Ciclo Unico 6 anni	Odontoiatria e protesi dentaria (2024)	comune	9	BIO/16

*Stampa del 07/05/2025*

# Biologia e genetica [ 1207103 ]

Offerta didattica a.a. 2024/2025

**Docenti:** FRANCESCA ZALFA, CARLA LINTAS

**Periodo:** Ciclo Annuale Unico

## Obiettivi formativi

The integrated course of Biology and Genetics aims to provide students with the knowledge and understanding of:

- the structure and the general organization of biological units and their reciprocal interactions;
- the constructive logic of the fundamental biological structures at the different levels of the living organisms and the general principles that govern the functioning of the biological units;
- the cellular processes common to all living beings: the mechanisms of expression and regulation of genetic information at the cellular and molecular level, the cellular reproduction mechanisms and the factors of intraspecific variability;
- the mechanisms of genetic information transmission in families and in the population; the role of genetics in medicine;
- the logic of the principles that govern the diversification of biological units, their characteristics of internal structuring and functional compartmentalization and their modality of genetic information expression, both longitudinally, along the evolutionary history, and among the different districts of each single individual (differentiation).
- some molecular biology and genetic techniques applicable in the clinical-diagnostic field.

## Prerequisiti

There is no prerequisite for this IC, but basic knowledge of chemistry, organic chemistry and biochemical are required.

## Contenuti del corso

Biology:

- General characteristics of living beings and their classification.
- The cell and cellular organelles: Cell theory. Molecular interactions in biological structures. Prokaryotic cell and eukaryotic cells.
- DNA replication and repair in prokaryotes and eukaryotes.
- Complexity of the eukaryotic genome: highly repeating DNA, medium repeating DNA and single sequence DNA. C-value and G-value paradox.
- RNA (structure and function). Transcription in prokaryotes and eukaryotes. Maturation of rRNAs, tRNAs and mRNAs. The main sncRNA: microRNAs, siRNAs, piRNAs and crispRNAs. The main lncRNA: XIST, HOTAIR and TERRA.
- Regulation of transcription in prokaryotes and eukaryotes.
- Regulation of mRNA stability and localization in the cytoplasm.
- Genetic code and protein synthesis (translation).
- Regulation of translation in eukaryotes.
- RNA interference and CRISPR CAS-9 system.
- Post-synthetic fate of proteins: Import of proteins into the RER, mitochondria, peroxisomes and nucleus. Protein maturation.
- Exocytosis and endocytosis.
- Cytoskeleton and cellular mobility: microfilaments, intermediate filaments and microtubules. Motor proteins: myosins, kinesins and dyneins.
- Cell division: Cell cycle and its regulation. Molecular aspects of mitosis and meiosis.
- Cell signaling and main signal transduction pathways. Apoptosis.
- Molecular basis of cancer.

Genetics:

- Correlation between genotype and phenotype: types of mutations in DNA (synonym, missense, nonsense, frameshift). Dominance, recessivity and codominance. Polymorphisms.
- Mendel's laws. Family transmission of monofactorial traits: autosomal, dominant and recessive inheritance. Dominant and recessive X-linked inheritance. The hypothesis of Mary Lyon.
- Exceptions to the Mendelian heritage: Incomplete penetrance, variable expressiveness and genetic heterogeneity. Genomic imprinting. Triplet expansion diseases.
- The human karyotype and its numerical and structural anomalies: Chromosome classification criteria and banding

methods. Normal and pathological human karyotype. Robertsonian translocations. Variations in the number of chromosomes: trisomies and monosomies.

- Genetics of the population: gene and genotype frequencies in the population. Hardy-Weinberg equilibrium. Evolutionary forces.

- Multifactorial traits and complex diseases: Genetics of quantitative traits. Association studies with molecular markers for the identification of susceptibility genes.

### **Metodi didattici**

The course is carried out by means of lectures and problem solving exercises with the whole class, divided as follows:

Biology

- 92,5 hours of face-to-face lessons.
- 20 hours of exercises

Genetics:

- 12,5 hours of face-to-face lessons.

The exercises are carried out in the following ways:

- In the classroom with the whole class (problem solving exercises).
- In the laboratory in small groups (practical exercises aimed at knowledge and learning of some basic molecular biology techniques applicable in the clinical-diagnostic field).

Furthermore, didactic materials are available on UCBM e-learning platform (power-point with integrated voice comments, videos, animations, etc.) and, upon request, there are also hours of tutoring and guided study with teachers or discipline tutors.

### **Modalità di verifica dell'apprendimento**

The exam consists of a written test of Biology and Genetics and an oral test of Biology (optional).

In exceptional cases, if irregularities are found or suspected in during the written test, teachers may make the oral test mandatory (in both Biology and Genetics) for such students.

Written tests contain 3 different types of questions:

- multiple choice questions, aimed at verifying the acquisition and knowledge of the aforementioned topics.
- problem solving, aimed at verifying the ability to apply the acquired knowledge and skills and the logic of the basic unitary principles for solving simple biological and/or genetic problems.
- open-ended questions, aimed at verifying the ability of analysis and synthesis and the ability to connect knowledge in a logical and coherent way for the production of a correct and complete manuscript.

The oral exam of Biology, in addition to evaluate the previously described aspects of learning, is also aimed at verifying the clarity of presentation and language properties.

The assessment of learning involves the attribution of a final vote expressed out of thirty (plus possible laud) and this attribution takes into account the two written tests and the oral test, based on the following criteria:

Written test of Biology: 10 multiple choice or problem solving questions (1 point each, 0 points for wrong or blank answers) and 2 open-ended questions (up to 10.5 points each).

Written test of Genetics: 16 problem solving questions (2 point each, 0 points for wrong or blank answers). 1 point of penalty in case of wrong answer.

Oral exam: 3 questions (up to 10 points each).

For the attribution of the aforementioned scores, is taken into consideration:

For multiple choice questions:

- the correctness of the answer (100%) For problem solving questions:

- the logic followed by the student in solving the problem (50%)

- the correctness of the procedure identified for solving the problem (50%) For open-ended questions and for the oral exam:

- the adequacy and relevance of the answer in relation to the skills that the student is expected to have acquired at the end of the course (40%)

- the correctness of the answer (30%)

- the ability to connect information logically and consistently (20%)

- the use of appropriate language (10%)

The final vote is attributed by arithmetic mean between:

- average vote of the two written tests (weighted for the CFU) - weight 50%

- vote of the oral test - weight 50%

The exam is not considered passed if the vote is lower than 18/30.

To achieve a score equal to or greater than 28/30, the student must demonstrate an optimal knowledge of all the topics of the IC, being able to connect them in a logical and coherent way, while "the laud" corresponds to an excellent preparation with a final grade above 30/30.

## Testi di riferimento

Reference books

BIOLOGY: Iwasa e Marshall, "Biologia Cellulare e Molecolare di Karp", EDISES.

GENETICS: Thompson & Thompson, "Genetica in Medicina", Nussbaum, McInnes, Willard, IDELSON-GNOCCHI.

For further information

BIOLOGY:

Cooper- Hausman, "La cellula : Un approccio molecolare", PICCIN.

Alberts e autori vari, "Biologia molecolare della cellula", ZANICHELLI.

GENETICS:

- Clementi e autori vari, Elementi di Genetica Medica, Casa Editrice EDISES

- Michael R. Cummings, "Eredità principi e problematiche della genetica umana", EDISES.

- Neri G., Genuardi M., "Genetica Umana e Medica", EDRA.

Additional didactic materials will be provided during the IC.

## Altre informazioni

Knowledge and understanding

- Know and understand the general principles of biology and genetics.
- Applying knowledge and understanding
- Ability to apply knowledge for solving simple biological and genetic problems.
- Ability to apply the experimental method to the study of fundamental biological and genetic phenomena.
- Ability to develop logical procedures and strategies that allow to perform precise and documented observations and to make a correct critical analysis in order to deduce generalizable principles.
- Ability to assess the risk of recurrence of genetic diseases in families.

**L'attività didattica è offerta in:**

## Facoltà Dipartimentale di Medicina e Chirurgia

<b>Tipo corso</b>	<b>Corso di studio (Ordinamento)</b>	<b>Percorso</b>	<b>Crediti</b>	<b>S.S.D.</b>
Laurea Magistrale Ciclo Unico 6 anni	Odontoiatria e protesi dentaria (2024)	comune	10	BIO/13, MED/03

*Stampa del 07/05/2025*

# Chimica e propedeutica Biochimica [ 1207104 ]

Offerta didattica a.a. 2024/2025

**Docenti:** MONICA BARI, FILOMENA FEZZA

**Periodo:** Ciclo Annuale Unico

## Obiettivi formativi

The course aims to provide the basic knowledge of general and inorganic chemistry in order to understand natural processes and phenomena such as the properties of the elements, the interactions between atoms, solutions and their properties, chemical reactions, thermodynamics and the kinetics of reactions. To provide the basic knowledge of organic chemistry aimed to the study of biochemistry: carbon chemistry, the structure of organic molecules, functional groups and their properties. To provide knowledge of the molecular bases of biological systems and of the structure-function relationships of macromolecules, with particular reference to the composition and main functions of tissues and fluids of the oral cavity. Emphasis is also given to the main metabolic pathways and their regulation at the molecular, cellular and tissue levels. In order to provide the biochemical knowledge to be applied in dental practice. In addition, the course aims to provide information on physiological and pathological processes in humans through the correct interpretation of specific and sensitive biomarkers.

## Prerequisiti

There is no prerequisite, but basic knowledge of mathematics and physics is required as prerequisites.

## Contenuti del corso

Chemistry: Atoms and molecules: atomic theory, periodic table, electron configuration of atoms; chemical bonding: ionic, covalent, nomenclature, structural formulas, electronegativity, polar and non-polar bonds; Chemical reactions: concept of mole, stoichiometry and types of reactions; The state of matter; Solutions: concentrations, molarity, solubility and colligative properties; Chemical thermodynamics: first and second laws of thermodynamics: definition of entropy, Gibbs energy. Chemical balance. Acids and bases definitions, strong and weak acids and bases, pH, titrations and buffers. Chemical kinetics; Nuclear chemistry. Organic compounds: nomenclature, physico-chemical characteristics, examples of clinical interest. Aliphatic and aromatic hydrocarbons; alcohols, polyols, phenols, thiols and ethers; amines, aldehydes and ketones, carboxylic acids and derivatives. Optical stereoisomerism. Biochemistry. Carbohydrates. Monosaccharides: classification and configuration. Monosaccharide derivatives. Disaccharides. Polysaccharides: Glycogen; Starch; Cellulose. Glycosaminoglycans. Glycoproteins. Proteoglycans. Proteins. Amino acids: structure and classification. Stereoisomerism. Acid-base properties. Peptide bond. Peptides. Proteins, isoelectric point. Primary, secondary, tertiary, quaternary structure. Nature of the chemical bonds stabilizing these structures. Denaturation. Folding processes and related pathologies. Fibrous Proteins: Collagen. Respiratory proteins: Heme. Myoglobin. Haemoglobin. Binding to oxygen and its regulation. Hemoglobinopathies. Enzymes. Catalysis concept. Enzymatic kinetics. Mechanisms of catalysis. Michaelis-Menten equation. Factors influencing enzyme activity. Enzyme inhibition. Active sites and allosteric sites. Isoenzymes. Enzymatic cofactors. Lipids. Classification. Fatty acids. Neutral fats. Phospholipids. Sphingolipids. Sterols. Fat-soluble vitamins: structure and function. Vitamins as precursors of cofactors. Proteolytic enzymes. Blood clotting factors. Biological membranes. Composition and structure. Membrane proteins and lipids. Kinetics and transport mechanisms across membranes. Active transport systems. Bioenergetics. Principles of thermodynamics. Redox reactions. "Energy-rich" bonds. ATP. Carbohydrate metabolism. Digestion and absorption. Aerobic and anaerobic glycolysis. Warburg effect. Glycogen synthesis and glycogenolysis. Pentose cycle. Gluconeogenesis. Krebs cycle. Electron transport and oxidative phosphorylation. Components of the mitochondrial electron transport chain. Lipid metabolism. Digestion and absorption. Bile salts. Lipid transport. Lipoproteins. Biosynthesis and catabolism of fatty acids. Ketogenesis. Cit P450 and metabolism of xenobiotic compounds. Amino acid metabolism. Protein digestion. Transamination. Deamination. Decarboxylation. Neurotransmitters. Urea cycle. Notes on heme synthesis and degradation. Hormones. Structure and functions. Mechanisms of action. Membrane receptors and intracellular receptors. Prostaglandins, thromboxanes and leukotrienes. Bone and calcification. Calcium and phosphorus metabolism. Structure of biological apatites. Mechanism of calcification and resorption. Role of collagen. Molecular mechanisms of enamel formation. Amelogenins. Oral environment: Saliva and its functions: inorganic constituents, organic constituents, salivary proteins. Crevicular gingival fluid: inorganic constituents, organic constituents. Biochemical basis of caries thrones; their organization. ATP synthetase. Reactive Oxygen Species. Clinical biochemistry. Organization of the clinical biochemistry laboratory, concepts of preanalytical, analytical and post-analytical variability. Validation and interpretation of laboratory data. Evaluation of liver function and diagnosis of jaundice. Acute and chronic liver diseases. Liver function and diagnosis of viral hepatitis. Diabetes mellitus. Hypoglycemia Lipid metabolism, dyslipidemia and atherosclerosis. Complete blood count. Disorders of heme synthesis and porphyrias. Hemoglobinopathies. Plasma proteins and electrophoresis. Haemostasis and coagulation.

Indices of renal function and urine examination. Hyperammonemia. Metabolism of amino acids (phenylketonuria, hyperhomocysteinemia). Disorders of water and salt balance and acid-base balance. Disorders of purine metabolism (hyperuricemia, gout). Study of calcium and phosphorus metabolism.

### Metodi didattici

70% of the course is delivered through lectures. It also includes 30% theoretical-practical exercises and the analysis of "scientific cases" on specific topics, as a moment of in-depth study and application of biochemical knowledge and professional skills, in line with the training objectives.

### Modalità di verifica dell'apprendimento

The exam consists of a written test consisting of multiple choice and open-ended tests on the entire program and an optional oral test that can be accessed after passing the written test. The choice of multiple choice aims to verify the ability to identify the key aspects of each topic, while the open-ended questions the ability to analyze and synthetically express the knowledge acquired and to be able to connect them in a logical and coherent way in a short and correct paper. The optional oral exam aims to ascertain the ability to expose, the actual degree of learning and the ability to independently re-elaborate the knowledge and skills described in the training objectives. The written test is considered passed with a minimum score of 18/30. To pass the exam with a grade close to 18/30, the student must demonstrate that he/she has acquired a basic knowledge of each topic. To achieve a score equal to or greater than 27/30, On the other hand, the student must demonstrate that he has acquired an excellent knowledge of all the topics covered during the course, being able to connect them in a logical and coherent way. The assessment of the acquisition of knowledge makes use of a written test and an oral test (optional), formulated with the logic described above for the final exam and administered at the end of the course.

### Testi di riferimento

Chimica generale: N.J. TRO, Chimica un approccio molecolare, EdiSES

Propedeutica biochimica: W.H: Brown, M.K. Campbell, S.O. Farrell, EdiSES

Biochimica: Nelson e Cox, I Principi di Biochimica di Lehninger, 7a Edizione, Zanichelli.

Nelson e Cox, Fondamenti di Biochimica di Lehninger, 1a Edizione italiana (dalla settima edizione americana) Zanichelli 2021.

Biochimica, Mary K. Campbell, Shawn O. Farrell, O. M. McDougal, EdiSES

Biochimica clinica: Trattato di biochimica clinica e medicina di laboratorio. Marcello Ciaccio; Giuseppe Lippi; Edises, 2021

Interpretazione clinica degli esami di laboratorio. Mariano Bizzarri. Editore: Piccin-Nuova Libreria. 2020

### Altre informazioni

**KNOWLEDGE AND UNDERSTANDING:** The student must have an adequate knowledge of the basic biochemical sciences on which Dentistry is based. Know and explain the main structural characteristics of biomolecules and their relationships with cellular structures and the functions they perform in metabolism. To know the biochemical components and processes to be able to link eating and diet habits with the maintenance of health and the prevention of bucco-dental diseases. Know the scientific method and acquire critical skills to evaluate consolidated knowledge and new discoveries.

**ABILITY TO APPLY KNOWLEDGE AND UNDERSTANDING:** The student must be able to formulate hypotheses, rework and critically evaluate information for problem solving, following the scientific method.

**MAKING JUDGEMENTS:** The student must be able to understand, critically evaluate and be able to use the sources of clinical and biomedical information to obtain, organize, interpret and communicate scientific and health information.

**COMMUNICATION SKILLS:** The student should be able to appropriately use biochemical, molecular biology and clinical biochemistry terminology in professional practice.

### L'attività didattica è offerta in:

#### Facoltà Dipartimentale di Medicina e Chirurgia

Tipo corso	Corso di studio (Ordinamento)	Percorso	Crediti	S.S.D.
Laurea Magistrale Ciclo Unico 6 anni	Odontoiatria e protesi dentaria (2024)	comune	13	BIO/10, BIO/10, BIO/11, BIO/12

Stampa del 07/05/2025

# Fisica medica [ 1207102 ]

Offerta didattica a.a. 2024/2025

**Docenti:** ALESSANDRO LOPPINI

**Periodo:** Primo Ciclo Semestrale

## Obiettivi formativi

The course aims to provide knowledge about the fundamentals of classical mechanics, thermodynamics and electromagnetism and give a basic knowledge of physical laws. The primary learning objective is the development in the student of the ability to grasp the essential aspects of physical processes, framing them with coherent descriptive and quantitative mathematical models, with particular regards to medical applications.

## Prerequisiti

Precalculus and algebra.

## Contenuti del corso

1) Mechanics and Fluid Dynamics (30 hours):

- Scientific method, units of measurement, dimensional analysis. (2 hours)
- Kinematics of bodies in one and two dimensions. Scalar and vector quantities. Uniformly accelerated motion. Dynamics of bodies: Newton's laws of motion. Circular motion. Gravitation. (12 hours)
- Work and energy: kinetic energy and potential energy. Momentum and collisions in one dimension. (5 hours)
- Rotational motion. Angular quantities. Torque. Rotational dynamics. Angular momentum. Static equilibrium. (6 hours).
- Statics and dynamics of fluids. (5 hours)

2) Calorimetry and Thermodynamics (10 hours):

- Temperature. Thermal equilibrium and the zeroth law of thermodynamics. Ideal gas law. Heat and calorimetry. (5 hours)
- First law of thermodynamics. Thermodynamic processes. Heat engines. Second law of thermodynamics. Definition of entropy. (5 hours)

3) Electromagnetism and Introduction to Modern Physics (20 hours):

- Electric charge, potential, and electric field. Electric current. Direct current electrical circuits. (10 hours)
- Magnetic fields. Electromagnetic induction. (3 hours)
- Electromagnetic waves. Light waves and basics of geometrical optics. (4 hours)
- Introduction to nuclear physics. Uses and effects of radiation. (3 hours)

Additionally, exercises on the program topics will be conducted (24 hours).

## Metodi didattici

Theoretical and practical lectures focused on the topics of the course. Teaching methods involve frontal lectures, slides and whiteboard.

## Modalità di verifica dell'apprendimento

Methods and Criteria for Learning Assessment:

Learning is evaluated through a written exam and a subsequent oral discussion designed to assess the student's preparation on the theoretical and practical topics presented during the course. The written exam includes multiple-choice questions and practical problems.

Criteria for Measuring Learning and Assigning the Final Grade:

The final grade is calculated based on the results of the written exam and the subsequent oral discussion. For the theoretical questions, each correct answer is awarded 1 point, and each incorrect answer is awarded 0 points. For each practical problem, the maximum score is 5 points. The maximum overall score is 30. To pass the exam, a minimum score of 18 is required both on the written and oral part. Cum Laude is awarded at the discretion of the lecturers in case of full mark and particular clarity in the exposition of the topics.

## Testi di riferimento

- Slides and material produced by lecturers and uploaded on the e-learning platform.

- Suggested textbooks: Fisica, Con fisica moderna. Douglas C. Giancoli. Casa Editrice Ambrosiana (CEA). Terza edizione. 2017.

### **Altre informazioni**

Knowledge and understanding

Students will achieve an adequate knowledge of physical laws and related mathematical aspects on broad aspects of classical physics, including:

- Kinematics and Newtonian dynamics.
- Fluids.
- Calorimetry and thermodynamics.
- Electromagnetism, geometrical optics and hints of modern physics.

Students will learn methodological-operational aspects of physics to interpret and describe medical problems.

Applying knowledge and understanding

At the end of the course, students will be able to correctly use theoretical knowledge to solve for practical problems and applications. Students will be able to interpret physical laws and apply them in different fields of medicine. The ability in applying theoretical knowledge will be acquired through specific practical lectures focused on problems resolution.

Making judgments

At the end of the course, students will be able to combine the acquired theoretical knowledge and practical experience to assess and analyze physical phenomena, by making assumptions and decisions in a consistent and reasoned way.

Communication skills

Students will develop the ability to describe physical laws at different levels of detail. In particular, they will be able to use both proper technical vocabulary and calculus skills to explain physical processes and the models behind them.

Learning skills

The class will provide individual skills in learning new topics by working on the basic knowledge acquired during the lectures. Students will acquire the capacity to learn advanced details on the topics presented and to extend their knowledge on further aspects of modern physics and on medical applications.

**L'attività didattica è offerta in:**

### **Facoltà Dipartimentale di Medicina e Chirurgia**

<b>Tipo corso</b>	<b>Corso di studio (Ordinamento)</b>	<b>Percorso</b>	<b>Crediti</b>	<b>S.S.D.</b>
Laurea Magistrale Ciclo Unico 6 anni	Odontoiatria e protesi dentaria (2024)	comune	7	FIS/07

*Stampa del 07/05/2025*

## **Inglese generale (idoneità) [ 12071C1 ]**

**Offerta didattica a.a. 2024/2025**

**Docenti:**

**Periodo:** Secondo Ciclo Semestrale

**Syllabus non pubblicato dal Docente.**

**L'attività didattica è offerta in:**

**Facoltà Dipartimentale di Medicina e Chirurgia**

<b>Tipo corso</b>	<b>Corso di studio (Ordinamento)</b>	<b>Percorso</b>	<b>Crediti</b>	<b>S.S.D.</b>
Laurea Magistrale Ciclo Unico 6 anni	Odontoiatria e protesi dentaria (2024)	comune	3	L-LIN/12

*Stampa del 07/05/2025*

## **Inglese generale (idoneità) [ 1207107 ]**

**Offerta didattica a.a. 2024/2025**

**Docenti:**

**Periodo:** Secondo Ciclo Semestrale

**Syllabus non pubblicato dal Docente.**

**L'attività didattica è offerta in:**

**Facoltà Dipartimentale di Medicina e Chirurgia**

<b>Tipo corso</b>	<b>Corso di studio (Ordinamento)</b>	<b>Percorso</b>	<b>Crediti</b>	<b>S.S.D.</b>
Laurea Magistrale Ciclo Unico 6 anni	Odontoiatria e protesi dentaria (2024)	comune	3	L-LIN/12

*Stampa del 07/05/2025*

# Istologia ed embriologia [ 1207106 ]

Offerta didattica a.a. 2024/2025

**Docenti:** MARIA ZINGARIELLO

**Periodo:** Ciclo Annuale Unico

## Obiettivi formativi

The main objective of the course is to provide the theoretical and practical concepts on the tissues structure and development with a focus on the hard and soft tissues of the oral cavity in order to facilitate the subsequent understanding of the pathological processes and the identification of consequent therapeutic measures

## Prerequisiti

For a correct and easier acquisition of the topics that will be addressed, it is necessary that the student has understood the fundamental notions of Physics (osmosis, oncotic pressure, etc.), Chemistry and Biochemical Propaedeutic concepts (concept of pH, chemical bonds, types of ions and types of molecules, etc.), Biology and Genetics (nucleic acids, proteins, lipids, carbohydrates, enzymes, cell and cell organelles, etc.).

## Contenuti del corso

Lecture Program:

**CYTOLOGY** - Overview of the general organization of the eukaryotic cell and the main chemical constituents of cells and tissues - Methods of study in cytology and histology: optical and electronic microscopy techniques; tissue preparation for microscopic examination; cell cultures; principles of histochemistry, immunohistochemistry and in situ hybridization - Plasma membrane: structure and ultrastructure; specializations and functions of the membrane and of the cell surface; permeability and transport; cell-environment interactions - Intracellular membrane systems: structure and functions of the smooth and granular endoplasmic reticulum and of the Golgi apparatus; endocytosis, exocytosis and cell secretion; lysosomes; peroxisomes; mechanisms for controlling the fate of synthesized proteins - Mitochondria: structure, ultrastructure and functions; biogenesis of mitochondria - Cytoskeleton: microtubules, microfilaments, intermediate filaments; relationships between cytoskeleton and other cellular and extracellular structures - Core: structure, ultrastructure; nuclear envelope and nucleocytoplasmic traffic; chromatin organization - Nucleolus: structure and ultrastructure; biogenesis of ribosomes - Cell division: chromosomes, mitotic apparatus; mitosis; phases and regulation of the cell cycle; growth factors - differentiation; proliferation; apoptosis; intercellular signals.

**HISTOLOGY** - Cellular aggregation: tissues, organs, apparatuses. The renewal of fabrics. Stem cells and kinetics of cell populations - Epithelial tissues: structural, embryological and functional classification of epithelia; specializations of the surface and polarity; basement membrane - Coating epithelia: structure of the main coating epitheliums - Glandular epithelia: morphofunctional classification of the glands; histological organization of the main glands - Epithelium of lining and glands of the oral cavity - Connective tissues: general characters and classification - Connective tissue p.d. : cells and intercellular substance; glycosaminoglycans and proteoglycans; amorphous matrix and fibers; biosynthesis and organization of extracellular components; functions of connective tissue; variety of connective tissue - Adipose tissue - Cartilaginous tissue: structural and functional characteristics; the cartilaginous matrix; cartilage types; cartilage histogenesis; perichondrium - Bone tissue: cells and intercellular substance; bone lamellae and lamellar systems; compact and spongy bone; periosteum and endosteal; ossification; augmentation and remodeling of the bone; metabolic functions of the bone - Tooth and oral cavity: morpho-functional characteristics of dental tissues: dentin, cement, enamel, pulp; periodontal ligament and alveolar bone; histological organization of the gingiva, of the oral cavity and of the attached glands - Blood: plasma; Red blood cells; White blood cells; platelets - myeloid tissue: hematopoiesis - lymphoid system: immunocompetent cells; structure of the lymphoid tissue; notes on the structure of the lymphoid organs - Muscle tissues: general characters and classification - Skeletal muscle tissue: structural and ultrastructural organization; molecular bases of muscle contraction; contraction control; skeletal muscle histophysiology - Cardiac muscle tissue: structural and ultrastructural organization - Smooth muscle tissue - Nervous tissue: general organization of the nervous system; the neuron and its extensions; impulse conduction; synapses; neuromuscular junction; neuroglia cells; histophysiology of the nervous tissue; general structure of the nerves.

**EMBRYOLOGY** - Gametogenesis: ovary and testis structure; meiosis; male and female gametogenesis - Fertilization: gamete changes; histophysiology of fertilization; the zygote - The week of development: segmentation; morula; blastocyst; embryoblast and trophoblast - II week of development: implant; bilaminar disk; evolution of the trophoblast - III week of development: development of the mesoderm; notochord; the three germinative leaflets and their derivatives; definition of the shape of the body - Embryonic appendages Ectoderma: neural tube and encephalic vesicles; stomodeo - Endoderma: primitive intestine; anterior gut and pharyngeal intestine: furrows, arches and gill pockets; development of salivary glands - Mesoderm: paraxial mesoderm; somites and their

derivatives; mesenchyme - Development of the teeth: the dental lamina, the dental gems, the goblet stage; origin of dentin, pulp and enamel; root formation; growth factors in tooth development.

Practical lesson:

Cytology and Histology: light and electron microscopy techniques; tissue preparation for microscopic examination; cell cultures; principles of histochemistry, immunohistochemistry and in situ hybridization.

Criteria for the identification of:

- living cells;
  - epithelial and glandular tissues of different body districts;
  - connective tissues of different body districts;
  - nervous tissue;
  - muscle tissues;
  - oral cavity and tooth tissues.
- Criteria for the differential diagnosis between different types of tissue.

### **Metodi didattici**

Lectures on Histology and Embryology with video projections and animations. Guidance in the analysis of histological preparations through practical exercises under a light microscope in which the student must learn to make tissue and organ diagnoses.. Tutoring Activities.

Lecture hours: 87.5

Practice hours: 25

Students will be divided in 2 groups during the practical lesson.

### **Modalità di verifica dell'apprendimento**

Light microscopy analysis of sample tissues and oral exam.

### **Testi di riferimento**

HISTOLOGY AND CYTOLOGY

-Istologia Umana. Mattioli Belmonte, et al. Idelson-Gnocchi.

-La cellula. Cooper. Piccin.

-Istologia. Monesi. Piccin.

-Istologia. Testo e atlante. Con elementi di biologia cellulare e molecolare. Ross, Pawlina. Casa Editrice Ambrosiana.

-Istologia. Dalle basi molecolari alle correlazioni cliniche. Kierszenbaum, Tress. Edra.

-Istologia con elementi di anatomia microscopica. Dalle Donne. Edises.

EMBRIOLOGIA

-Embriologia Umana. Bertini et al, Idelson-Gnocchi.

-Embriologia. Barbieri-Carinci. CEA.

-Lo sviluppo prenatale dell'uomo Embriologia ad orientamento medico, Moore-Persaud, EdiSes.

-Larsen Embriologia Umana. Schoenwolf, Bleyl, Brauer. Edra.

-Embriologia umana. De Felici, et al. Piccin.

EMBRIOLOGY AND HISTOLOGY OF STOMATOGNATHIC SYSTEM

-Istologia ed Embriologia Orale, Maraldi-Gagliano, Edi-Ermes.

-Embriologia e Istologia del cavo orale, Mjör-Fejerskov, Edi-Ermes.

TO REINFORCE THE KNOWLEDGE

-Biologia-Citologia Medica. Maraldi, Tacchetti. Edi-Ermes.

-Istologia Medica. Maraldi, Tacchetti. Edi-Ermes.

Junqueira Istologia Testo e Atlante, Mescher, Piccin.

Atlante di Istologia e Anatomia microscopica, Wheater, Casa Editrice Ambrosiana.

Istologia ed Embriologia Orale, Maraldi-Gagliano, Edi.Ermes.

Atlante di Anatomia microscopica del Dente e del Parodonto, Fonzi, Piccin.

### **Altre informazioni**

-Acquisition of appropriate scientific language.

-Recognition of various tissues and organs.

-Knowledge of the theoretical-practical basis of the normal structure and development of body tissues with emphasis on hard and soft tissues.

-Acquisition of independent judgment and diagnostic skills.

**L'attività didattica è offerta in:**

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Laurea Magistrale Odontoiatria e protesi dentaria (2024)  
Ciclo Unico 6 anni

comune

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BIO/17, BIO/17

*Stampa del 07/05/2025*

## **Metodologia scientifica e scienze delle relazioni [ 1207101 ]**

**Offerta didattica a.a. 2024/2025**

**Docenti:** MASSIMO CICOZZI, CHIARA MORETTI

**Periodo:** Primo Ciclo Semestrale

**Syllabus non pubblicato dal Docente.**

**L'attività didattica è offerta in:**

**Facoltà Dipartimentale di Medicina e Chirurgia**

<b>Tipo corso</b>	<b>Corso di studio (Ordinamento)</b>	<b>Percorso</b>	<b>Crediti</b>	<b>S.S.D.</b>
Laurea Magistrale Ciclo Unico 6 anni	Odontoiatria e protesi dentaria (2024)	comune	10	M-PSI/01, MED/01, INF/01, MED/02

*Stampa del 07/05/2025*

## Verifica Competenze Iniziali - Biologia [ 1207VER03 ]

Offerta didattica a.a. 2024/2025

*Docenti:*

*Periodo:* Primo Ciclo Semestrale

**Syllabus non pubblicato dal Docente.**

**L'attività didattica è offerta in:**

**Facoltà Dipartimentale di Medicina e Chirurgia**

<b>Tipo corso</b>	<b>Corso di studio (Ordinamento)</b>	<b>Percorso</b>	<b>Crediti</b>	<b>S.S.D.</b>
Laurea Magistrale Ciclo Unico 6 anni	Odontoiatria e protesi dentaria (2024)	comune	0	BIO/13

*Stampa del 07/05/2025*

## Verifica Competenze Iniziali - Chimica [ 1207VER04 ]

Offerta didattica a.a. 2024/2025

**Docenti:**

**Periodo:** Primo Ciclo Semestrale

**Syllabus non pubblicato dal Docente.**

**L'attività didattica è offerta in:**

**Facoltà Dipartimentale di Medicina e Chirurgia**

<b>Tipo corso</b>	<b>Corso di studio (Ordinamento)</b>	<b>Percorso</b>	<b>Crediti</b>	<b>S.S.D.</b>
Laurea Magistrale Ciclo Unico 6 anni	Odontoiatria e protesi dentaria (2024)	comune	0	BIO/10

*Stampa del 07/05/2025*

## Verifica Competenze Iniziali - Fisica [ 1207VER01 ]

Offerta didattica a.a. 2024/2025

**Docenti:**

**Periodo:** Primo Ciclo Semestrale

**Syllabus non pubblicato dal Docente.**

**L'attività didattica è offerta in:**

**Facoltà Dipartimentale di Medicina e Chirurgia**

<b>Tipo corso</b>	<b>Corso di studio (Ordinamento)</b>	<b>Percorso</b>	<b>Crediti</b>	<b>S.S.D.</b>
Laurea Magistrale Ciclo Unico 6 anni	Odontoiatria e protesi dentaria (2024)	comune	0	FIS/07

*Stampa del 07/05/2025*

## Verifica Competenze Iniziali - Matematica [ 1207VER02 ]

Offerta didattica a.a. 2024/2025

**Docenti:**

**Periodo:** Primo Ciclo Semestrale

**Syllabus non pubblicato dal Docente.**

**L'attività didattica è offerta in:**

**Facoltà Dipartimentale di Medicina e Chirurgia**

<b>Tipo corso</b>	<b>Corso di studio (Ordinamento)</b>	<b>Percorso</b>	<b>Crediti</b>	<b>S.S.D.</b>
Laurea Magistrale Ciclo Unico 6 anni	Odontoiatria e protesi dentaria (2024)	comune	0	MED/01

*Stampa del 07/05/2025*