

## **Anatomy**

### *Expected learning outcomes*

At the end of the course the students will be able:

- explain and describe the position of anatomy within the morphological science, argue the importance for medical professions, describe the anatomical methods and different anatomical disciplines, analyze the units in human body, bilateral symmetry and metamerism, anatomically define body parts, describe differences in constitutions, different genders, female, and male
- explain and describe the basic features of macroscopic bone structure, analyze and compare bone shapes, describe the basic mechanisms of development, growth, bone remodeling and bone healing, describe the basic parts and topographic position of individual bones of the skeletal system
- explain and describe the basic types of joints between the bones and the types of movements that allow, describe the basic parts and position of individual joints and the movements that allow
- explain and describe the structure, parts and shapes of skeletal muscle, describe and show the muscles of individual anatomical regions on an anatomical preparation, describe the function and innervation of muscles
- explain and describe the basic elements of a chewing apparatus; teeth (morphological forms of tooth types, two generations of dentition, deciduous and permanent teeth, apply anatomical way of marking and recording dental formula, analyze differences in the shape of the lower and upper jaw in relation to tooth existence, irrigation and innervation of teeth), jaw joint (structure and function) and masticatory muscles
- describe the types and structure of blood vessel walls, small and large blood circulation, terminal and collateral branching, topographic position and path of individual arteries and veins, describe and explain the shape and structure of the heart, heart cavities and ears, explain the function of the heart as a pump
- describe the structure of nervous tissue with special emphasis on the structure of neurons, describe and explain the anatomical and physiological division of the nervous system, define the organs of the central and peripheral nervous system, describe each organ of the nervous system (brain, spinal cord, cranial and spinal nerves, sensory and autonomic ganglia), describe and explain the function of projection, commissure, and associative pathways of the nervous system
- describe and explain the structure of hollow and parenchymatous organs of the digestive, respiratory, sexual, urinary system, and endocrine glands
- describe and show topographic regions and spaces of the head and neck (position, restrictions for regions or walls for spaces, describe communications with neighboring topographic areas, define the content of the region or space and the path by which the anatomical structure enters the defined area

## **Dental ethics and deontology**

### *Expected learning outcomes*

At the end of the course the students will be able to:

- differentiate concepts of morality, ethics, bioethics, dental ethics and deontology and describe the relationships
- analyse ethical dilemmas, developing ethical judgment and problem solving skills
- be familiar with the items of the Code of Dental Ethics and Deontology of the Croatian Dental Chamber
- analyse the types of doctor-patient relationship and describe the concepts of autonomy and paternalism
- compare the contracting parties and describe the content of the informed consent or refusal of treatment
- distinguish professional duties and values, distinguish between the concepts of privacy and confidentiality and discuss the ways of violating them
- analyse the concepts of social justice and access to oral health care

- connect the principles of business according to ethical frameworks in dental medicine
- analyse the ways of regulating the advertising in dental medicine and ethics and professionalism in digital media
- differentiate the norms of treatment of individuals who are not competent to give consent in the dental practice
- analyse the role of the ethics committee and the content of informed consent as a part of a clinical trial
- formulate ethical norms in research involving animal models
- formulate ethical norms in research involving children
- analyse the ways to act in case of poor professional work and consider the possibilities of resolving a dispute between a patient and a dentist

## Biochemistry

### *Expected learning outcomes*

After this course, students will be able to:

- describe and distinguish the structure; understand the properties of biological macromolecules and their importance in biological systems.
- explain and compare the principles of bioenergetics, thermodynamics, and kinetics of reactions occurring in the living organism.
- explain the factors of enzymatic activity and describe the importance of the enzymes in biological reactions and understand the roles of vitamins in metabolic processes and enzyme activity.
- analyse the fundamental concepts of the metabolism and explain the catabolic and anabolic reactions.
- explain mechanisms of regulation of metabolic processes and the role of hormones in the integration of metabolism.
- explain and compare the mechanisms of fuel molecules provision (storage and immobilization).
- describe and distinguish the biochemical methods for analysis of macromolecules and their metabolites in biological samples and critically analyse experimental data.

## Physics

### *Expected learning outcomes*

After having passed the exam of this course, students can be considered competent to:

- apply the principles of physics to explain the biomechanics of the human body with particular reference to the jaws and teeth
- apply the principles of hydromechanics and gas physics in describing the human cardiovascular and respiratory systems
- apply the principles of thermodynamics to describe heat transfer, metabolism, and the human body as a thermodynamic system
- apply the principles of electricity to describe the transport of substances across membranes, biopotentials, the nervous system, and cardiac function
- apply the principles of geometrical optics and wave physics in describing the sense of sight and hearing.
- solve simple problem tasks, perform measurements in physics, and analyse the results

## Physiology and pathophysiology I

### *Expected learning outcomes*

Expected learning outcomes:

View the cell and the organism as an integrated system, interpret and explain normal and disturbed physiological values and basic hematological tests.

- critically evaluate individual conditions of the organism, especially normal functioning and the overall response of the organism to perturbation

Specific Competencies:

- Explain the principles of physiological feedback and determine the homeostatic mechanisms of major functional systems and explain the pathophysiological principles of disease
- describe the main physiological and pathophysiological processes at the cellular level

- explain the principles of electrophysiology, the generation and propagation of action potentials
- explain the composition of blood and plasma, maturation, function of individual blood cells and disorders of hematopoietic organs
- explain the mechanism of inflammation
- explain the structure, mechanisms and disorders of muscle contraction

## Histology with Embryology

### *Expected learning outcomes*

At the end of this course students will be able to:

- demonstrate a working knowledge of human histology and development and correlate the structure and function of human body
- comprehend the molecular, biochemical and cellular events that regulate the development of specialized cells, tissues and organs during embryonic development, tissue interactions and pattern formation, understand the experimental strategies and techniques that are used to identify the molecular and cellular mechanisms of development.
- acquainted with structures and development of the human body by means of classical and contemporary methods of microscopic investigations and embryonic development
- master the skills of microscopy of the most characteristic cells, tissues and organs presented as histological slides

## Medical Chemistry

### *Expected learning outcomes*

After having passed the exam of this course, students can be considered competent to:

- Specify and explain the role of biogenic elements and bioinorganic compounds
- Correlate the structure with properties of apatite minerals (hydroxyapatite, fluorapatite)
- Explain the effect of chelating agents and their application in medicine and dental medicine
- Describe the role of chelates in biological systems
- Predict physical and chemical properties of molecules based on the molecular structure and type of intermolecular interactions
- Describe basic information on the amount, distribution and role of water in the organism
- Describe colligative properties of solutions
- Calculate the molar mass of the solute from the data acquired by measuring the colligative properties
- Define the terms "acid" and "base" using the Arrhenius, Brønsted – Lowry and Lewis theory
- Describe conjugate acids and conjugate bases relations
- Explain the acid-base behaviour of amphoteric compounds
- Describe salt hydrolysis
- Calculate pH values of solutions
- Describe mechanisms involved in acid-base regulation in the organism
- Specify pH values of body fluids
- Explain properties of colloid solutions
- Explain the influence of Donnan's equilibrium on pH values in the cell, osmotic pressure, membrane potential and oedema
- Resolve problems and tasks linked to calculating and transforming solution concentrations
- Calculating pH values of buffer solutions and buffer capacity
- Describe actions of buffer solutions
- Define basic principles of kinetics in chemical reactions and regulation of reaction rate
- Describe mechanism of catalytic action
- Define basic terms of thermodynamics and thermodynamic values
- Apply the first and second law of thermodynamics on biochemical systems
- Explain the influence of  $\Delta G$ ,  $\Delta H$  and  $\Delta S$  values on the spontaneity of reaction
- Describe the supply of biological systems with energy
- Describe the principles of chemical reaction equilibrium, kinetic and thermodynamic condition of equilibrium
- Describe the difference between the dynamic equilibrium and the constant flow, as well as the

role of the constant flow in biological systems

- Define reactions of oxidation and reduction and the terms “oxidizer” and “reducer” in inorganic and organic chemistry as well as in biochemistry
- Define the meaning of standard electrode potential and explain the causal connection between solution concentration and the potential
- List biologically important redox systems
- Classify organic compounds according to their functional groups and explain their chemical properties
- Define the types of reactions of organic compounds
- Explain the concept “nucleophile” and “electrophile”
- Explain hybridization, resonance and inductive effect
- Define alkanes, alkenes, alkynes, alkylhalogenides, aromatic compounds and their chemical properties and reactivity
- Define biologically important oxygen compounds (alcohols, phenol, ethers), and their nomenclature, chemical properties and reactivity
- Define carbohydrates, explain their structure, nomenclature and chemical properties with special regard to their importance in dental medicine
- Name and explain the structure of biologically most important monosaccharides, disaccharides and polysaccharides
- Define carboxylic acids and their derivatives, their nomenclature, chemical properties and reactivity
- Describe the structure, nomenclature, chemical properties and reactivity of lipids and fatty acids
- Define biologically important heterocyclic compounds, their nomenclature, chemical properties and reactivity
- Define isomerism and types of isomerism (structural, positional, stereoisomerism, geometrical isomerism and conformational isomerism) and their meaning for biological molecules
- Define chirality and its importance in biological systems
- Define specific reactions of groups of organic compounds with an emphasis on biologically important representatives of each compound class
- Define the IUPAC and trivial names of biologically important organic compounds and describe their chemical properties

## Oral hygiene

### *Expected learning outcomes*

After this course, students will be able to:

- define and understand the concept of oral hygiene
- explain and define dental biofilm
- analyse the significance of oral hygiene in dental pathology, periodontology, paediatric dentistry, oral medicine and orthodontics, as well as in patients at risk.
- explain the meaning of dental bacterial plaque
- describe oral hygiene techniques
- identify and compare dental instruments
- analyse oral hygiene index
- analyse sulcus bleeding index
- identify mechanical and chemical means for oral hygiene maintenance
- explain the procedures for oral hygiene maintenance

## Dental professions

### *Expected learning outcomes*

At the end of the course it is expected that students will be able to:

- identify the scope of dental medicine, target organs and tissues and basic oral diseases

- differentiate organization and levels of dental care
- know health care financing and types of insurance
- name the collaborative dental staff and the describe their scope
- classify courses in the dental program, the organization and duration of study and universities where you can be educated for regulated professions in dental medicine in Croatia
- compare specialist disciplines of dental medicine, their organization, scope and duration of education
- present the scope of work and organization of the professional chamber
- analyse the models of conducting lifelong learning, legal entities that can conduct education and regulation
- connect the equipment and instruments used in a dental office and the method of work
- define ergonomics, list occupational and iatrogenic diseases, ways of occurrence and prevention measures

## Cell biology with genetics

### *Expected learning outcomes*

- differentiate between three domains of life on earth
- describe the fundamental principles of cellular biology and apply them to current biological issues (how the cell structure relates to its functions),
- usage of light microscope
- prepare the slides of biological specimens
- describe molecular biology techniques and tools and their application
- describe cell cycle and explain how these processes are regulated
- explain basics of cell signaling, how it regulates cellular functions and how dysregulation of signaling processes leads to cancer and other diseases
- describe basics of human genome organization, eukaryotic and prokaryotic gene organization, human genome architecture and variability
- explain basic genetic mechanisms (dna replication, genome maintenance, gene expression control)
- classify genetic and chromosomal mutations
- describe basic and advanced cytogenetic and molecular-genetic methods in mutation detection and differential genetic diagnosis
- calculate and interpret the recurrence risk for monogenic and polygenic human diseases
- interpret the behavior of cells in their microenvironment in multi-cellular organisms (i.e. a cell within its social context) with emphasis on cell-cell interactions, cell-extracellular matrix interactions
- describe basic mechanisms of oncogenesis
- describe basics of gametogenesis, fertilization and early embryonic development
- usage of the scientific terminology, collecting scientific literature and organization of individual or group work
- integrate the knowledge of different educational units; acknowledge the interdisciplinary nature of the biomedicine field.