COURSE OUTLINE

(1) GENERAL

MD-201 Structure and function of the human body I

SCHOOL	Medical		
ACADEMIC UNIT	Basic and Clinical Sciences		
LEVEL OF STUDIES	1st Cycle		
COURSE CODE	MD-201	**SEMESTER**	Year 2 / Semester 3 (Fall)
COURSE TITLE	Structure and function of the human body I		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
	20	11
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Core
PREREQUISITE COURSES:	None
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	
COURSE WEBSITE (URL)	

(2) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

Cardiovascular System

<u>Theme 1: The heart as a pump</u>

- Describe key events in heart development, including the development of the cardiac tube, looping and septation to form the heart chambers and outflow tract, and the configuration of the adult heart.
- Outline the common abnormalities in heart development that lead to pathologies.
- Outline foetal circulation and describe the adaptations taking place at birth.
- Identify the main chambers of the heart, their regional characteristics and the surfaces of the heart.
- Describe the normal flow of blood through the heart.
- Identify the different heart valves, their function and characteristics (including location,

structure, site of auscultation).

- Describe the pericardium and pericardial cavity.
- Identify the special characteristics of the myocardium.
- Describe the histology of the three layers of the heart wall (i.e. endocardium, myocardium and epicardium), considering in particular the heart musculature (i.e. myocardium).
- Discuss the physics of sound waves, including the production of an ultrasound beam and its interaction with materials.
- Explain the detection of echoes using a transducer and describe A, B, and M mode imaging, as well as Doppler imaging of blood flow and elastography.
- Outline the importance of safety and quality assurance in ultrasound.
- Explain and demonstrate probe selection, patient positioning and scanning technique for cardiac ultrasound.
- Identify key anatomical structures using ultrasound and applications in clinical practice.
- Identify the four chambers of the heart and heart valves using ultrasound (apical view).
- Identify the four chambers of the heart, heart valves and major vessels using ultrasound (parasternal long, parasternal short and subcostal view).
- Demonstrate a thorough understanding of the functioning of the heart, including:
- The cardiac cycle (i.e. the Volume-Pressure ["Wiggers"] Diagram).
- The origin of normal and abnormal heart sounds in relation to the cardiac cycle.
- The physiology and biochemistry of cardiac muscle contraction and relaxation.
- The relation of the cardiac cycle to the electrocardiogram.
- The determinants of cardiac contractility including intrinsic regulation (the Frank-Starling mechanism), extrinsic regulation (the role of the autonomic nervous system) and the effect of serum ion levels on heart function.
- Explain what is meant by Cardiac Output and Venous Return to the heart.
- Describe the concepts of 'preload', 'afterload', 'contractility' and 'stroke volume' in the context of optimum cardiac function.
- State Laplace's law and explain the link to heart work and mural tension.
- Describe what is meant by the term ''Excitation-contraction coupling''.

Cultural competence

- Explain the basic models and definitions of cultural competence.
- Describe the importance of cultural competence and identify the core competences necessary for ensuring cultural competence in healthcare practice.
- Outline organisational cultural competence.
- Explain the practise of cultural competence across cultures.

Medical Ethics

- Identify and discuss the ethical challenges of practising medicine in diverse communities and multicultural contexts.

Theme 2: Circulation and Haemostasis

- Identify the anatomy of the thoracic aorta and its main branches, as well as the structures they supply
- Identify the branches of the descending thoracic aorta and the structures they supply.
- Describe the major relations of the ascending, arch, and descending thoracic aorta.
- Describe the common variations of the branches of the arch of the aorta and their clinical significance.
- Identify the azygos venous system and describe its communications with the caval system of veins.
- Describe the location of the oesophageal and pulmonary plexuses and superficial and deep cardiac plexuses.

- Describe the coronary circulation.
- Describe the venous drainage of the heart.
- Outline the different microscopic features of arteries and veins.
- Identify the differences between different types of arteries (from elastic artery to arteriole) and veins (from large vein to venule).
- Identify laminar and turbulent flow to explain how blood behaves under different conditions, such as in various vessel sizes and during exercise.
- Describe the dynamics and control of coronary blood flow, heart muscle oxygen consumption and biochemistry and explain events leading to ischaemia.
- Demonstrate a thorough understanding of the functioning of the vascular system, including:
- The major differences between the arterial and venous systems.
- How systemic circulation is maintained, in terms of the relationship between blood pressure, blood flow, and vascular resistance.
- The autoregulation of blood flow to different organs and tissues.
- The role of the lymphatic system in augmenting the circulation and in maintaining overall fluid balance.
- Describe the significance of haemostasis and outline the key elements of primary and secondary haemostasis.
- Outline the coagulation cascade and distinguish between the extrinsic and intrinsic pathways.
- Explain the role of vitamin K in the production and function of clotting factors.
- Outline how the natural inhibitors, tissue factor pathway, antithrombin III, proteins C and S regulate the coagulation cascade and prevent thrombosis.
- Describe the fibrinolytic pathway, its regulators and its products.
- Explain how a balance is maintained between the opposing mechanisms of coagulation (coagulation and fibrinolysis).

Professionalism

- Consider what Professionalism is and why it is vital for you as students and future doctors
- Review role of the General Medical Council and guidance for the medical profession

Theme 3: The heart as an electrical conductor

- Provide a detailed description of the anatomy of the conducting system of the heart, including the sinoatrial (SA) node, atrioventricular (AV) node, bundle of His, bundle branches, and Purkinje fibers.
- Provide a detailed description of the blood supply of the conducting system, including the right coronary artery and its branches, and the left coronary artery, where applicable.
- Describe the phases and ion channels involved in the action potential in cardiac tissue
- Explain why the SA Node is often termed the ‘pacemaker’ of the heart.
- Explain what is meant by the term ‘pacemaker potential’.
- Describe how and why various electrolyte disturbances (e.g., potassium and calcium) might impact on cardiac conduction.
- Outline the function of the electrocardiogram, its basic components, and how these relate to cardiac electrical activity.
- Describe the steps of reading an electrocardiogram.
- Explain how the ECG leads correspond to the anatomical location of the heart and its blood supply.

Theme 4: The cardiovascular system as a pressure generator

- Explain the concept of blood pressure to an intelligent non-medical adult, including an explanation of the systolic and diastolic components.

- Describe the physiological determinants of blood pressure control.
- Describe the relationship of vascular anatomy, radius, flow and pressure gradients and Poiseuille's Law.
- Discuss how and why the blood pressure varies in different blood vessel types.
- Describe the particular role of the autonomic nervous system in the regulation of blood pressure, blood flow and vascular resistance.
- Explain the role of capacitance vessels and of distal arteries and arterioles in the genesis and maintenance of systolic and diastolic BP.
- Outline the role of the kidneys and the renin-angiotensin-aldosterone axis in the regulation of blood pressure.
- Outline the regulation of the systemic circulation and describe changes in response to cold, heat and shock.

Research Methods and Statistics

- Explain random error and its impact in research
- Distinguish between population parameter and sample estimate
- Distinguish between the different sampling methods (random, systematic, convenience)
- Explain the rationale and interpretation of confidence interval

Respiratory System

Theme 1: Respiratory Pathways and Ventilation

- Describe the normal anatomy of the upper airways (larynx, trachea) and the respiratory tree.
- Describe the anatomy of the diaphragm and the phrenic nerve and identify the main structures crossing the diaphragm and the vertebral levels at which this happens.
- Describe the surface anatomy of the thorax with reference to the upper airways and the lungs.
- Describe the anatomy of the thoracic skeleton, including major anatomical landmarks, bones of the thoracic cage, and muscles of the thorax.
- Describe the histology of the conducting portion of the respiratory system (nasal cavity, pharynx, larynx, trachea, bronchi).
- Distinguish between the trachea, bronchi, and bronchioles in a microscopic specimen.
- Explain the overall respiratory and non-respiratory functions of the respiratory system.
- Describe inspired air gas content and the mechanics of airflow to the alveoli and alveolar ventilation.
- Explain what determines airway resistance in the normal lung.
- Describe the control/regulation of respiration.

Theme 2: Gas Exchange and Circulation

- Describe the gross structure of the pleural membranes, the pleural subdivisions, and the parietal pleural surfaces.
- Describe the subdivisions and levels of the mediastinum and identify the mediastinal structures and their anatomical relationships.
- Recognize a normal CXR, identifying all key thoracic structures and normal mediastinal contours.
- Discuss the histology of the respiratory portion of the system (intrapulmonary bronchial tree, bronchioles, and alveoli).
- Outline the physical nature of lung operating units, i.e., alveoli.
- Describe the concepts of pulmonary gas exchange, including the diffusion of oxygen and carbon dioxide through the respiratory membrane and their transport in the blood.
- Understand the physiology of the pulmonary circulation, defining pulmonary blood pressure, blood flow, and vascular resistance, and explain the autoregulation of pulmonary blood flow.

- Describe lung volumes and capacities (FEV1, FVC, FEV1/FVC ratio, and TLC) and apply this knowledge to an explanation of what "lung function studies" (spirometry) measure.

Research Methods and Statistics

- Explain and apply the principles of hypothesis testing (formulating null/alternative hypotheses)
- Select appropriate statistical tests/models such as t-test, ANOVA and chi-square, paired/unpaired)
- Understand and interpret p values.
- Interpret measures of association for continuous outcomes (correlations, regression coefficients). res of association for continuous outcomes (correlations, regression coefficients).

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

Knowledge

- Explain normal human structure and function at the molecular, cellular, tissue, organ and whole-body level from conception to old age.
- Explain the scientific principles underlying common and important disease processes including inflammation, infection, neoplasia and trauma.
- Describe the role of genetics in predicting the risk of disease and in personalised medicine.
- Explain the concept of 'wellness' and describe the importance of promoting lifestyle factors in achieving the best possible health.

(3) SYLLABUS

Cardiovascular System Themes:

- The heart as a pump
- Circulation and haemostasis
- The heart as an electrical conductor
- The cardiovascular system as a pressure generator

Respiratory System Themes:

- Respiratory pathways and ventilation
- Gas exchange and circulation

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	*Use of ICT in teaching / Χρήση ΤΠΕ* *Communication with students / Επικοινωνία με Φοιτητές*

TEACHING METHODS

The manner and methods of teaching are described in detail.
Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.

The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS

Activity	*Semester Workload*
Lectures/large-group teaching*	61
Tutorials	24
Small group work	24
Laboratories**	12
Directed self-study***	96
Coursework	15
Revision/assessment	45
Total	**277**

STUDENT PERFORMANCE EVALUATION

Description of the evaluation procedure

Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other

Specifically-defined evaluation criteria are given, and if and where they are accessible to students.

- Final exam (80%)
- Coursework (20%)

(5) ATTACHED BIBLIOGRAPHY

Required Textbooks/Reading:

Authors	Title	Edition	Publisher	Year	ISBN
Arthur F. Dalley, Anne M. R. Agur	Moore's Clinically oriented anatomy	9th Int'l Edition	Wolters Kluwer Health	2024	9781975209544
Sadler, Thomas	Langman's Medical Embryology	15th Edition	Wolters Kluwer	2024	9781975180010
Pawlina, Wojciech	Histology: A Text and Atlas with correlated cell and molecular biology	9th Edition	Wolters Kluwer	2024	9781975181574

Recommended Textbooks/Reading:

Authors	Title	Edition	Publisher	Year	ISBN
Costanzo, Linda	BRS: Physiology	8th Edition	Wolters Kluwer	2023	9781976963467
Halliday, N.L. & Chung, H. M	BRS Gross Anatomy	10th Edition International	Lippincott Williams & Wilkins	2023	9781975181482