



DISCIPLINE SHEET MEDICAL PHYSIOLOGY 2025-2026

1. Data about the programme

1.1.	“ CAROL DAVILA” UNIVERSITY OF MEDICINE AND PHARMACY
1.2.	FACULTY OF MEDICINE
1.3.	DEPARTMENT 1st DEPARTMENT OF PRECLINICAL EDUCATION 1 - FUNCTIONAL SCIENCES
1.4.	DISCIPLINE MEDICAL PHYSIOLOGY
1.5.	FIELD OF STUDY: HEALTH – Sectorally regulated within the European Union
1.6.	STUDY CYCLE: LICENCE
1.7.	STUDY PROGRAME: MEDICINE – ENGLISH MODULE

2. Data about discipline

2.1.	Name of the discipline in the educational plan:: Medical Physiology				
2.2.	Subject code: DFII 5 S4M				
2.3.	Subject type ((FS – fundamental subject / SS – specialty subject / CS – complementary subject):):FS				
2.4.	Subject status (CS – compulsory subject / ES – elective subject / OP – optional subject):CS				
2.5.	Course coordinator Prof. Ioana Raluca Papacoea MD PhD Asoc. Prof Mariana Cătălina Ciornei MD PhD Asoc. Prof Cristian Scheau MD PhD Lecturer Antoaneta Pungă MD PhD				
2.6.	Seminar coordinator: Prof. Ioana Raluca Papacoea MD PhD Assoc. Prof Mariana Cătălina Ciornei MD PhD Assoc. Prof Cristian Scheau MD PhD Lecturer Antoaneta Pungă MD PhD Asist. Radu Tiberiu Vrabie MD PhD Asist. Alina Gabriela Dumitrescu MD PhD Asist. Timpuriu Sofia, MD PhD - Asist. Andra Vrabie MD PhD				
2.7. Year of study	II	2.8. Semester	2	2.9. Type of evaluation (E/C)	MCQ examination

3. 3. Total estimated time (hours/ semester of teaching activity and of exam preparation / independent study

I. Academic exam preparation (teaching activity, practical application, assessment)						
3.1. Number of hours per week	5	out of which	3.2. lecture	2	3.3. seminar/ laboratory session	3
3.4. Total number of hours from	70	out of which	3.5. lecture	28	3.6. seminary/ laboratory	42

the curriculum						
Assessment (number of hours): 7						
II. . Exam preparation / independent study						
Distribution of allocated time						hours
Study of textbooks, courses, books, minimum recommended bibliography						15
Additional library documentation, documentation via the internet						15
Carrying out specific project preparation activities, laboratory, assignments, essays						10
Presentations or evaluation preparation, final exam preparation						10
Academic consultations						15
Other activities						15
3.7. Total hours of independent study						80
3.9. Total hours per semester (3.4.+ 3.7.)				150		
3.10. Number of credit points				6		

4. Prerequisites (where applicable)

4.1. for curriculum	Biochemistry, Biophysics, Anatomy, Cell Biology, {Physiology (1st year)}
4.2. of competencies	Computer use (Word, Microsoft Office, PPT)

5. Requirements (where applicable)

5.1. to conduct the lecture	PowerPoint presentations, use of multimedia systems, and projector
5.2. for delivering the seminar / laboratory session	Equipped with the necessary apparatus for conducting practical activities

6. Learning outcomes

Knowledge	Skills	Responsibility and autonomy
The student/graduate identifies, describes, and explains fundamental concepts regarding the characteristics of the healthy human organism, both structural (anatomical, histological, cellular, and molecular) and functional (physiological, biochemical, biophysical), as well as the principles of the methods used to investigate biological functions.	The student/graduate will be able to correctly interpret and apply fundamental concepts related to the structure and functions of the human body, as well as the methods used to investigate biological functions	The student/graduate integrates fundamental concepts and methods of investigating biological functions, formulates, and assumes well-argued conclusions regarding health or disease

Use of physiology-specific terminology, explanation and interpretation of physiological parameters under these conditions	Use of laboratory equipment specific to physiology	Critical interpretation of the collected data and of their applicability in experimental models
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7. Subject learning objectives (correlated with the learning outcomes)

7.1. General learning objective	o acquire advanced, specialized knowledge of the physiology of fluid compartments, the renal-urinary system, blood functions, the circulatory system, and the respiratory system
7.2. Specific learning objective	This course provides an understanding of the fundamental properties of living matter in correlation with its structural organization. It further develops advanced knowledge of the specialized functions of the body's main systems (fluid compartments, renal-urinary system, blood, circulatory system, respiratory system) and of the regulatory mechanisms that enable these systems to adapt to diverse internal and external demands.

8. Contents

8.1. Course	Teaching method	Observations
I. Homeostasis of the main fluid compartments II. Blood III. Physiology of the vascular system IV. Physiology of the renal-urinary system V. Physiology of the respiratory system 1.Homeostasis of the main fluid compartments: the concept of the internal environment; distribution of total body water (extracellular, intracellular, and transcellular), volumes, composition, and physiological variations; dynamics of water and electrolyte exchanges between compartments; water, electrolyte, and osmotic balance, including definitions, determinants, and neuroendocrine regulatory mechanisms; the possibilities and limits of homeostasis illustrated by clinical models of water and osmotic imbalance; and disorders of water and electrolyte homeostasis (dehydration, overhydration)	Interactive exposition of the material according to the analytical program, using multimedia means, powerpoint presentations, didactic videos	2h
2. Blood Composition and functions of blood Physico-chemical properties of blood Plasma Composition of blood plasma Plasma proteins and their roles Osmotic and colloid-osmotic pressure		2h

Acid–base balance and blood pH Physiological variations of blood pH Plasma mechanisms for maintaining acid–base balance Pathological variations of blood pH		
3 Erythrocytes Functional morphology Functional aspects of hematopoiesis Regulation of erythropoiesis Hemoglobin synthesis Iron metabolism in the body Catalytic factors in hemoglobin synthesis Functions of the erythrocyte and its membrane Erythrocyte degradation. Physiological hemolysis Blood groups and Rh factor. Transfusion		2h
4.Leukocytes and Immunity Leukopoiesis; structure and roles of leukocytes; classification Nonspecific immunity Components of the nonspecific immune system Natural barriers Granulocytes Functions of neutrophil and eosinophil granulocytes Functions of basophil granulocytes (mast cells) Monocyte–macrophage complex; role of macrophages in immunity Specific immunity Lymphocytes Antigens and immunogenicity Antibodies Cells involved in the specific immune response Types of humoral immunity according to the mode of development Disorders of immunity		2h
5.Platelets Thrombocytopoiesis; structure and roles of platelets Physiological hemostasis Primary hemostasis. Evaluation of primary hemostasis Secondary hemostasis (blood coagulation).		2h
6.Evaluation of secondary hemostasis Regulation of hemostasis. Hemostasis disorders Hemostasis and implications in thromboembolic disease Fibrinolysis Regulation of fibrinolysis. Clinical implications		2h

7. Microcirculation Tissue distribution of blood flow Control of microcirculation by the autonomic nervous system Local control of microcirculation Regulation of smooth muscle activity via the endothelium Capillary circulation Morphological and functional particularities of capillaries Blood flow in capillaries Structure of the capillary wall Substance transport across the capillary wall Regulation of capillary circulation Nervous regulation Humoral regulation Lymph Circulation Capillaries and lymphatic vessels Formation of lymph Determinants of lymph circulation Role of lymphatic circulation		2h
8. Venous Circulation Morphological and functional particularities of the venous system Functions of the veins Factors influencing venous return Venous pressure Regulation of venous circulation Circulation time		2h
9. Regional Circulatory Particularities Coronary circulation Cerebral circulation Circulation of skeletal muscle Cutaneous circulation		2h
10. Physiology of the Renal-Urinary System Functional morphology of the kidney Vascularization of the kidney Innervation of the kidney Mechanism of urine formation Glomerular filtration Tubular functions: the mechanisms of renal tubular transport, and the physiological processes of urine dilution and concentration Participation of the kidney in maintaining acid–base balance: tubular secretion of hydrogen ions; renal reabsorption of bicarbonate; the disodium phosphate–monosodium phosphate buffer system; ammonia secretion; and the limits of renal contribution to acid–base regulation.		2h
11. Secretory Function of the Kidney		2h

Renin Erythropoietin Renal vasodilator factor (medullin) Release of kinin-forming enzymes Aspects of Glomerulo-Tubular Balance Physical mechanisms involved in regulating glomerulo-tubular function Nervous and humoral interactions with the pressure–natriuresis–diuresis mechanism Regulation of Renal Function Nervous mechanisms regulating renal function Hormonal mechanisms regulating renal function Physiology of the Urinary Tract Physiology of the urinary bladder Micturition – the neuro-reflex mechanism of micturition		
12. Physiology of the Respiratory System Morphological and functional particularities of the respiratory system Airways Functional structure of the lung Vascularization of the lung Nutritional vascularization Functional vascularization Pulmonary lymphatic circulation Innervation of the lung Mechanics of pulmonary ventilation Movements of the thoracic cage Movements of the lungs Flow–volume loop Ventilatory dysfunctions Pleura Equation of motion of the thoraco-pulmonary system – Pulmonary resistance Ventilatory work Pulmonary volume–pressure curve – Pulmonary hysteresis;		2h
13. Gas Exchange at the Alveolo-Capillary Level Factors influencing alveolo-capillary transfer Transfer of respiratory gases through the alveolo-capillary membrane Oxygen transfer Carbon dioxide transfer Diffusion of inert gases Transfer of water and various solutes across the alveolo-capillary membrane Blood transport of respiratory gases Transport of oxygen in the blood Dissolved O₂ Oxygen free radicals and oxidative stress		2h

Combined form of O ₂ Oxygen reserves of the body Transport of carbon dioxide in the blood Dissolved CO ₂ Combined forms of CO ₂ CO ₂ dissociation curve		
14. Tissue Respiration Stages of cellular respiration Measurement of respiratory gases Regulation of Respiration Nervous regulation Humoral regulation Central chemoreceptor control Peripheral chemoreceptor control Other reflexes affecting respiration Voluntary control of respiration Role of the upper airways Regulation of Bronchomotricity Nervous regulation Humoral regulation		2h
Bibliography of recent books: 1. Course materials of the discipline 2. MEDICAL PHYSIOLOGY TEXTBOOK coordinator Prof.Univ Dr. Papacoea Ioana Raluca, Editura Universitara Carol Davila 2025 3. PRACTICAL GUIDE OF PHYSIOLOGY coordinator Prof Univ Dr. Papacoea Ioana Raluca Editura Universitara Carol Davila 2025 4. Guyton, A.C., Hall, J.E. Textbook of Medical Physiology, 14th Edition, Philadelphia: Saunders, 2021 5. Boron, W.F., Boulpaep, E.L. Medical Physiology, 3rd Revised Edition, Philadelphia: Saunders, 2017		
8.2. Laboratory session / practical activity	Teaching methods	Observations
Introduction – Fluid Compartments	Integration of artificial intelligence and critical analysis of information. Practical and theoretical applications involving biological samples, biochemical techniques, and functional tests. Interactive programmed teaching methods, including the use of multimedia resources, educational films, and the presentation and discussion of laboratory reports with students	3h
Buffer capacity of plasma Hemoglobin and hematocrit determination Identification of hemoglobin using Teichmann's crystal method		3h
Erythrocyte count Erythrocyte indices		3h
ESR (erythrocyte sedimentation rate) Blood groups and Rh factor		3h
Leukocyte count Leukocyte formula (differential leukocyte count)		3h
Platelet count Rumpel–Leede test Bleeding time (BT) (TS – Timpul de sângerare) Clotting time (CT)		3h
Blood pressure measurement (under different conditions) Analysis of pulse waves Carotidogram, peripheral sphygmogram		3h
Venous pressure		3h

Jugulogram (jugular venous pulse tracing) Capillaroscopy		
Physico-chemical properties of urine. Clearance tests		3h
Dilution and concentration test. Bulletin analysis		3h
Spirometry -flow volume loop		3h
Respiratory disfunctions		3h
Analysis of blood gas reports		3h
Seminar	Assessment of knowledge and clarification of concepts	3h
Bibliography of recent books: 1. PRACTICAL GUIDE OF PHYSIOLOGY coordinator Prof Univ Dr. Papacoea Ioana Raluca Editura Universitara Carol Davila 2025 2. Guyton, A.C., Hall, J.E. Textbook of Medical Physiology, 14th Edition, Philadelphia: Saunders, 2021 3. Boron, W.F., Boulpaep, E.L. Medical Physiology, 3rd Revised Edition, Philadelphia: Saunders, 2017		

9. Evaluation

Type of activity	9.1. Assessment criteria	9.2. Assessment methods	9.3. Assessment weighting within the final grade
9.4. course	Attendance Participation Questions asked	Exam with 60, 5-choice questions, grouped/multiple complement	50%
9.5. Seminar/ practical activity	Attendance Participation Papers/reports presented Experiments performed	Practical exam Activity during the year Seminar grade	50%
9.5.1. Individual project (if required)	-	-	-
9.6. Minimum performance standard			
The threshold for grade 5 is set based on the total number of points, according to the Gauss curve.			

Date:
19.09.2025

Signature of the course coordinator

Signature of the laboratory session coordinator

Date of approval in the
Department Council:

Signature of the Head of the Department