Physiology with pathophysiology

1. IMPRINT

Academic Year	2024/2025
Department	Faculty of Medicine and Dentistry
Field of study / Subject	English Dentistry Division
Main scientific discipline	Medical sciences
Study Profile	General academic
Level of studies	Uniform MSc
Form of studies	Full-time program
Type of module / course	Obligatory
Form of verification of learning outcomes	Exam after IV semester
Educational Unit / Educational Units	Department of Experimental Physiology and Pathophysiology Pawińskiego 3C, 02-106 Warszawa phon. 22 57 20 734; e-mail: 1s7@wum.edu.pl
Head of Educational Unit / Heads of Educational Units	Professor Marcin Ufnal, MD, PhD
Course coordinator	Professor Marcin Ufnal, MD, PhD; mufnal@wum.edu.pl phon. 22 57 20 734
Person responsible for syllabus	Marek Konop, MSc, PhD; marek.konop@wum.edu.pl phon. (22) 57 20 734
Teachers	Marcin Ufnal, MD, PhD; mufnal@wum.edu.pl Marek Konop, MSc, PhD; marek.konop@wum.edu.pl

2. BASIC INFORMATION

Year and semester of studies	II year, III & IV semester	**Number of ECTS credits**	7

FORMS OF CLASSES **Contacting hours with academic teacher**	**Number of hours**	**ECTS credits calculation**
Lecture (L)	30 (28 in e-learning)	1
Seminar (S)	45	1,5
Discussions (D)	-	-
e-learning (e-L)	-	-
Practical classes (PC)	55	2
Work placement (WP)	-	-
Unassisted student's work		
Preparation for classes and completions	80	2,5

3. COURSE OBJECTIVES

O1	To give the insight into understanding the function, control and co-ordination of body systems
O2	To acquaint the students with main pathologic processes, which may affect the functions of the body
O3	To give the students experience in interpretation of the basic symptoms of disease and of the results of laboratory analyses

4. STANDARDS OF LEARNING – DETAILED DESCRIPTION OF EFFECTS OF LEARNING

Code and number of effect of learning in accordance with standards of learning	**GENERAL LEARNING EFFECTS:**
Knowledge – Graduate* knows and understands:	
B.W17.	human vital functions

B.W18.	neurohormonal regulation of physiological processes
B.W19.	acid-base balance and oxygen and carbon dioxide transport in the body
B.W20.	enzymes involved in the digestive process, the mechanism of hydrochloric acid production in the stomach, the role of bile, the process of absorption of the products of digestion
B.W21.	principles of metabolism and nutrition
B.W22.	numerical value of basic physiological variables and changes in those values
C.W13.	concepts of homoeostasis, adaptation, immunity, predisposition, vulnerability, compensation mechanisms, feedback and "vicious circle" mechanism
C.W14.	concept of health and disease, mechanisms of origin and development of a disease process at the molecular, cellular, tissue and systemic levels, and the effect of those mechanisms on the clinical symptoms, prognosis, and complications of a disease
C.W15.	mechanisms of inflammatory reaction and wound healing
Skills– Graduate* is able to:	
C.U4.	explain the aetiopathogenesis, present the clinical, macroscopic, and microscopic image and evolution of pathological changes, and predict their consequences
C.U5.	analyse the clinical course of diseases in pathological processes

5. ADDITIONAL EFFECTS OF LEARNING

Number of effect of learning	**Effects of learning in time**
Knowledge – Graduate knows and understands:	
K1	-
Skills– Graduate is able to:	
S1	-
Social Competencies – Graduate is ready for:	
SC1	-

6. CLASSES

Form of class	**Class contents**	**Effects of Learning**
Lectures	L1 – Lecture 1: Introduction to physiology. Definition of Physiology, Pathophysiology and Homeostasis. Cell, tissue and organ physiology. Mechanisms of short- and long-term regulation.	B.W17., B.W18., B.W19., C.W13., C.W13.

	L2 – Lecture 2: Principles of blood flow in the cardiovascular system. Functions of the cardiovascular system. Mechanical and electrical activity of the heart. ECG and the most common cardiac arrhythmias.	B.W17., B.W19., C.W13.
	L3 – Lecture 3: Regulation of cardiovascular function. Short-term and long-term regulation of the cardiovascular system. The role of the sympathetic and parasympathetic nervous system in cardiovascular regulation. The role of the kidney and the renin-angiotensin-aldosterone system.	B.W17., B.W18., B.W19., B.W20.
	L4 – Lecture 4: Pathophysiology of the cardiovascular system. The most common cardiovascular diseases, risk factors and pathomechanisms. Primary and secondary hypertension. Heart failure.	B.W17., C.W13., C.W13., C.W14., C.U4., C.U5.
	L5 –Lecture 5: Physiology and pathophysiology of the respiratory system. Nervous regulation of the respiratory system, reflexes. The most common restrictive and obstructive diseases of the respiratory system, risk factors and pathomechanisms.	B.W17., B.W18., B.W19., B.W20., C.W13., C.W13., C.U4., C.U5.
	L6 – Lecture 6: Physiology and pathophysiology of the kidneys. Functions of the kidneys in the human body. Nervous and hormonal mechanisms regulating glomerular filtration. The most common kidney diseases, risk factors and pathomechanisms.	B.W17., B.W19., B.W20., C.W13., C.W13., C.U4., C.U5.
	L7 – Lecture 7: Kidneys II – acid-base balance. Laws of water-electrolyte balance. Changes in pH in acid-base disorders. Discussion of blood buffers. Role of blood buffers in acid-base metabolism. The role of the lungs in acid-base metabolism. The role of the kidneys in acid-base metabolism. Compensatory mechanisms of acid-base disorders.	B.W17., B.W19., B.W20., C.W13.
	L8 –Lecture 8: Physiology and pathophysiology of the gastrointestinal tract. Physiology of the oral cavity. Mechanisms of saliva formation and disorders of its secretion. Neuronal regulation of gastrointestinal function. Physiology and pathophysiology of food swallowing. Regulation of gastric juice secretion and mucosal barrier function. Pathophysiology of gastroesophageal reflux disease and peptic ulcer disease. Comparison of the physiology of the small and large intestine. Pathophysiology of celiac disease.	B.W17., B.W19., B.W20., C.W13., B.W22., C.W13., C.W14., C.U4., C.U5.
	L9 – Lecture 9: Principles of neurophysiology. Neurons and glial cells. Types of stimuli received by the nervous system. Receptors. Reflex arc. Sensory and motor pathways. Organization of the central and peripheral nervous system. Comparison of the function of the spinal cord and higher centers of the nervous system.	B.W17., B.W19., B.W20., C.W13., C.W14.
	L10 – Lecture 10: Pathophysiology of the nervous system. The most common diseases of the nervous system. Risk factors and pathomechanisms. Extrapyramidal syndromes, cerebellar dysfunction.	B.W17., B.W18., C,W13., C.W14., C.U4., C.U5.
	L11 – Lecture 11: Thermoregulation. Exercise physiology. Nervous and hormonal regulation of body temperature. Tremor and chemical thermogenesis.	B.W17., B.W19., B.W20., C.W13., C.W14.
	L12 – Lecture 12: Inflammatory reaction. Wound healing. Structure and function of the skin. Composition of the inflammatory reaction. Acute wound versus chronic wound. Phases of wound	B.W17., B.W19., C.W13., C.W14.

	healing. Calcium and phosphorus metabolism. Remodeling of bone tissue. Factors affecting bone turnover.	
	L13 – Lecture 13: Principles of hormonal regulation. Comparison of the nervous and endocrine systems. Structure of hormones. Ways in which hormones interact with target cells. Comparison of the action of protein and steroid hormones. Mechanisms regulating hormone secretion. Negative feedback. The organs of the endocrine system.	B.W17., B.W18., B.W22., C.W13..
	L14 – Lecture 14: Physiological changes occurring in the human body from newborn to old age. Developmental periods in human life. Summary of the course.	B.W17., C.W13., C.U4.
Seminars (S) and practical class (PC)		
S1, PC1	S1 – Seminar 1 and C1 – Practical Class 1 – Membrane and action potentials.	B.W19., C.W13.
S2, PC2	S2 – Seminar 2 and C2 – Practical Class 2 – Blood – physiology and pathophysiology.	B.W17., B.W19.-B.W21., C.W13., C.W13., C.U4., C.U5.,
S3, PC3	S3 – Seminar 3 and C3 – Practical Class 3 – Hemodynamic cycle of the heart. Principles of blood flow in the cardiovascular system.	B.W19., C.U4., C.U5.,
S4, PC4	S4 – Seminar 4 and C4 – Practical Class 4 – Regulation of cardiovascular function. Pathophysiology of arterial hypertension.	B.W19.,
S5, PC5	S5 – Seminar 5 and C5 – Practical Class 5 – The conducting system of the heart. Electrocardiography.	B.W19., B.W20., C.W13., C.W13., C.W15., C.U4., C.U5.,
S6, PC6	S6 – Seminar 6 and C6 – Practical Class 6 – Coronary circulation. Ischeamic heart disease. Myocardial infarction. Heart failure.	B.W19., B.W20., C.W13., C.W15., C.U4., C.U5.,
S7, PC7	S7 – Seminar 7 and C7 – Practical Class 7 – Microcirculation and the lymphatic system. Circulatory Shock.	B.W19., B.W20., C.W13., C.W15., C.U4., C.U5.,
S8, PC8	S8 – Seminar 8 and C8 – Practical Class 8 – Physiology of the respiratory system.	B.W19 C.W13, C.W15, C.U4., C.U5.,
S9, PC9	S9 – Seminar 9 and C9 – Practical Class 9 – Pathophysiology of the respiratory system.	B.W.17-B.W19 C.W13, C.W15, C.U4., C.U5.,
S10, PC10	S10 – Seminar 10 andC10 – Practical Class 10 – Physiology and pathophysiology of the kidneys.	B.W19., B.W20., C.W13., C.W13, C.W15., C.U4., C.U5.,
S11, PC11	S11 – Seminar 11 and C11 – Practical Class 11 – Regulation of water-electrolyte and acid-base balance.	B.W19.-B.W21., C.W13,, C.W13, C.W15, C.U4., C.U5.,
S12, PC12	S12 – Seminar 12 and C12 – Practical Class 12 – Physiology and pathophysiology of the gastrointestinal tract.	B.W19., B.W20., B.W22, C.W13, C.W13, C.W15, C.U4., C.U5.,
S13, PC13	S13 – Seminar 13 and C13 – Practical Class 13 – Physiology and pathophysiology of the pancreas and liver.	B.W19., B.W20., B.W22, C.W13, C.W13, C.W15, C.U4., C.U5.,

S14, PC14	S14 – Seminar 14 and C14 – Practical Class 14 – Neurotransmitter systems in the brain.	B.W19., B.W20., C.W6.,
S15, PC15	S15 – Seminar 15 and C15 – Practical Class 15 – Physiology of the sensory system.	B.W19., B.W20., C.W13., C.W15,, C.U4., C.U5.
S16, PC16	S16 – Seminar 16 and C16 – Practical Class 16 – Physiology and pathophysiology of muscles.	B.W19., C.W13, C.W15, C.U4., C.U5.
S17, PC17	S17 – Seminar 17 and C17 – Practical Class 17 – Physiology and pathophysiology of the motor system.	B.W17., B.W20., C.W13, C.W14., C.U4., C.U5.
S18, PC18	S18 – Seminar 18 and C18 – Practical Class 18 – Autonomic nervous system.	B.W19., B.W20., C.W13.
S19, PC19	S19 – Seminar 19 and C19 – Practical Class 19 – The special senses – vision, hearing, taste and smell.	B.W18., C.W13., C.W14., C.U4., C.U5.
S20, PC20	S20 – Seminar 20 and C20 – Practical Class 20 – Learning and memory.	B.W19., C.W13., C.W15, C.U4., C.U5.
S21, PC21	S21 – Seminar 21 and C21 – Practical Class 21 – Endocrinology I: Thyroid hormones. Adrenocortical hormones.	B.W19., B.W20., C.W13, C.W13., C.W15., C.U4., C.U5.
S22, PC22	S22 – Seminar 22 and C22 – Practical Class 22 – Endocrinology II: Insulin and Glucagon. Growth Hormone.	B.W19., B.W20., C.W13., C.W13., C.W15., C.U4., C.U5.
S23, PC23	S23 – Seminar 23 and C23 – Practical Class 23 – Hormonal regulation of reproduction. Pregnancy.	B.W18., B.W19., C.W13, C.W14., C.U4., C.U5.
S24, PC24	S24 – Seminar 24 and C24 – Practical Class 24 – Lifestyle diseases.	B.W22, C.W13,, C.W14,, C.U4., C.U5.
S25, PC25	S25 – Seminar 25 and C25 – Practical Class 25 – Diagnostic tests – physiological principles.	B.W19.- C.W13., C.W13., C.W15., C.U4., C.U5.

7. LITERATURE

Obligatory

1. Guyton AC, Hall AC. Textbook of Medical Physiology, 13th edition, 2015, W.B. Saunder's Co., Philadelphia.
2. McPhee SJ, Hammer GD. Pathophysiology of Disease: An Introduction to Clinical Medicine, 8th edition, 2019, McGraw-Hill.

Supplementary

1. Koeppen B.M., Stanton B.A. Berne & Levy Physiology, 7th edition, 2017, Mosby Co.

8. VERIFYING THE EFFECT OF LEARNING

Code of the course effect of learning	Ways of verifying the effect of learning	Completion criterion

B.W17.- B.W22., C.W13. – C.W15., C.U4., C.U5.,	1. Verbal or written checking of preparation for each seminar or exercise. 2. Preparation of the presentation. The content, method of delivery and the ability to discuss are assessed. 3. Preparation of papers and other written assignments commissioned by lecturers. Fulfillment of the conditions in point. 1, 2 and 3 allows you to approach to the final test. Intermediate, MCQ-type examinations on the completion of each of the 4th blocks of teaching. The intermediate tests consisting of 50 questions (single and multiple choice) The exam (100 one-choice test questions) checks the knowledge of the content presented in lectures, seminars and classes. The following exam grades shall apply: **Mark** — **Range** 2.0 (fail) — 0-59% of the maximum number of points 3.0 (satisfactory) — 60-69% of the maximum number of points 3.5 (better than satisfactory) — 70-74% of the maximum number of points 4.0 (good) — 75-84% of the maximum number of points 4.5 (better than good) — 85-89% of the maximum number of points 5.0 (very good) — 90-100% of the maximum number of points	Active participation in classes assessed on the basis of a short checking test. ≥ 60% of the maximum number of points

9. ADDITIONAL INFORMATION

1. Lectures cover the latest issues in experimental and clinical physiology based on the current knowledge gained by Department Staff at numerous conferences and scientific congresses.
2. Person responsible for teaching: Marcin Ufnal, MD, PhD (mufnal@wum.edu.pl)
3. Attendance at lectures, seminars and exercises is obligatory (attendance list).
4. The student is entitled to 1 unexcused absence. Other absences must be confirmed by a sick leave, which must be delivered to the Department's Secretariat within 7 days of returning to the University.
5. Any absence from class (including excused absences) must be made up. The form of the class to be made up must be defined with the Assistant in charge of that class.
6. The first and second exam terms are in test form. In the event of failure, the third term can only take place with the approval of the Head of Department.
7. Please arrive at the class on time. Being late over 15 minutes is treated as absence. It is strictly forbidden to use cell phones during the classes.
8. Students Research Scientific Group of Experimental Cardiology (contact: professor Marcin Ufnal, MD, PhD - mufnal@wum.edu.pl)
9. Exam - one-choice test, passed ≥60% of the maximum number of points.
10. Information about the Course will be posted on the Department's website: http://physiology.wum.edu.pl

ATTENTION

The final 10 minutes of the last class in the block/semester/year should be allocated to students' Survey of Evaluation of Classes and Academic Teachers