





Summer Semester:												
Department of Pathophysiology	10			30								
TOTAL per year:												
Department of Pathophysiology	20			60								
<b>Educational objectives (max. 6 items)</b> C1. learning about the mechanisms of maintaining homeostasis in health and in pathology C2. fusion of knowledge from other basic sciences (including physiology, biophysics, anatomy, biochemistry) to the interpretation of pathomechanisms of specific individuals and disease syndromes C3. theoretical preparation of the student for clinical classes C4. learning the pathomechanisms underlying functional and organic changes of particular organs and systems C5. learning about the interpretation of the pathophysiology based on the results of selected laboratory tests (electrocardiography, gasometry, blood morphology, endocrine tests)												
Education result matrix for module/course in relation to verification methods of the intended education result and the type of class												
Number of course education result	Number of major education result	Student who completes the module/course knows/is able to	Methods of verification of intended education results (forming and summarising)	Form of didactic class <i>**enter the abbreviation</i>								
<b>W 01</b>	<b>B.W1</b>	student can describe water and electrolyte economy in biological systems.	oral response, credit test, written exam, debate	L, MC								
<b>W 02</b>	<b>B.W2</b>	student can describe the acid-base balance and the mechanism of action of buffers and their importance in homeostasis	oral response, credit test, written exam, debate	L, MC								
<b>W 03</b>	<b>B.W3</b>	student knows and understands the terms: solubility, osmotic pressure, isotonia, colloidal solutions and Gibbs-Donnan balance	oral response, credit test, written exam, debate	L, MC								
<b>W 04</b>	<b>B.W16</b>	student knows the metabolic profiles of basic organs and systems	oral response, credit test, written exam, debate	L, MC								
<b>W 05</b>	<b>B.W18</b>	student knows the enzymes involved in digestion, the mechanism of producing hydrochloric acid in the stomach, the role of bile, the course of absorption of digestive products and disorders associated with them	oral response, credit test, written exam, debate	L, MC								
<b>W 06</b>	<b>B.W19</b>	student knows the consequences of improper nutrition, including long-term starvation, over-abundant meals and the use of an unbalanced diet	oral response, credit test, written exam, debate,	L, MC								
<b>W 07</b>	<b>B.W20</b>	student knows the consequences of a deficiency of vitamins or minerals and their excess in the body	oral response, credit test, written exam, debate	L, MC								
<b>W 08</b>	<b>B.W23</b>	student knows in a basic scope the issue of stem cells and their applications in medicine	oral response, credit test, written exam, debate	L, MC								



<b>W 09</b>	<b>B.W24</b>	student knows the basis of stimulation and conduction in the nervous system and higher nervous functions, as well as physiology of striated and smooth muscles and blood functions	oral response, credit test, written exam, debate	L, MC
<b>W 10</b>	<b>B.W25</b>	student knows the activity and mechanisms of regulation of all organs and systems of the human body, including the circulatory, nervous, respiratory, digestive, urinary and skin layers, and understands the relationships existing between them	oral response, credit test, written exam, debate	L, MC
<b>W 11</b>	<b>B.W26</b>	student knows the mechanism of action of hormones and the consequences of disorders of hormonal regulation	oral response, credit test, written exam, debate	L, MC
<b>W 12</b>	<b>B.W27</b>	student knows the course and regulation of reproductive functions in women and men	oral response, credit test, written exam, debate	L, MC
<b>W 13</b>	<b>B.W28</b>	student knows the mechanisms of aging of the body	oral response, credit test, written exam, debate	L, MC
<b>W 14</b>	<b>B.W29</b>	student knows the basic quantitative parameters describing the efficiency of individual systems and organs, including the scope of the norm and demographic factors affecting the value of these parameters	oral response, credit test, written exam, debate	L, MC
<b>W 15</b>	<b>C.W26</b>	student knows the basic mechanisms of cell and tissue damage	oral response, credit test, written exam, debate	L, MC
<b>W 16</b>	<b>C.W28</b>	student knows the definition and pathophysiology of shock, with particular regard to the varying causes of shock and multiple organ failure	oral response, credit test, written exam, debate	L, MC
<b>W 17</b>	<b>C.W29</b>	student knows the etiology of disorders hemodynamics, back changes and basic changes	oral response, credit test, written exam, debate	L, MC
<b>W 18</b>	<b>C.W32</b>	student lists the factors of disease: internal and external, modifiable and non-modifiable	oral response, credit test, written exam, debate	L, MC
<b>W 19</b>	<b>C.W33</b>	student lists clinical characters of the most common diseases of different organs and systems, metabolic diseases and disorders of water-electrolyte and acid-base	oral response, credit test, written exam, debate	L, MC
<b>W 20</b>	<b>E.W13</b>	student knows and is able to distinguish between basic units of neurological symptoms	oral response, credit test, written exam, debate	L, MC
<b>U 01</b>	<b>B.U3</b>	student knows the relationship between factors disturbing the balance of biological processes and physiological and pathophysiological changes  student describes changes in the functioning of	oral response, credit test, written exam, debate	MC



U 02	B.U8	the body in a situation of homeostatic disorder, in particular, defines its integrated response to physical effort, exposure to high and low temperature, loss of blood or water, sudden standing, transition from sleep to wakefulness	oral response, credit test, written exam, debate	MC
U 03	B.U9	student performs simple functional tests assessing the human body as a stable regulation system (stress tests, stress tests); interprets numerical data on basic physiological variables	oral response, credit test, written exam, debate	MC
U 04	C.U12	student examines the phenomena of reactive, defensive, and adaptation and adjustment disorders caused by etiological factor	oral response, credit test, written exam, debate	MC
<p>** L - lecture; SE - seminar; AC – auditorium classes; MC – major classes (non-clinical); CC – clinical classes; LC – laboratory classes; SCM – specialist classes (magister studies); CSC – classes in simulated conditions; FLC – foreign language course; PCP practical classes with patient; PE – physical education (obligatory); VP – vocational practice; SS – self-study, EL – E-learning .</p>				
<p>Please mark on scale 1-5 how the above effects place your classes in the following categories: communication of knowledge, skills or forming attitudes: Knowledge: 5 Skills: 5 Social competences: 0</p>				
<b>Student's amount of work (balance of ECTS points)</b>				
<b>Student's workload</b> (class participation, activity, preparation, etc.)			<b>Student Workload (h)</b>	
1. Contact hours:			80	
2. Student's own work (self-study):			15 + 63 = 78	
Total student's workload			158	
ECTS points for module/course			6,0	
Comments			-	
<b>Content of classes</b> (please enter topic words of specific classes divided into their didactic form and remember how it is translated to intended educational effects)				
<b>Lectures</b>				
1. Introduction to human pathophysiology				
2. Pathomechanisms of heart rhythm disorders, bases od electrocardiography (ECG)				
3. Diseases of the cardiovascular system				
4. Pathophysiology of the nervous system				
5. Diseases of the kidneys and urinary tract				
6. Respiratory diseases				
7. Coagulation disorders, haematological diseases				
8. Diseases of the digestive system				
9. Disturbances of water-electrolyte and acid-base balance				
10. Disturbances of the endocrine system				
<b>Practical classes</b>				
1. INTRODUCTION TO HUMAN PATHPHYSIOLOGY				



- discussion of the principles of organizing classes in pathophysiology, class rules and evaluation criteria
  - the basics of homeostasis
  - main tasks of pathophysiology
  - discussion of causative factors and mechanisms leading to the emergence and development of the disease process on the molecular, cellular, tissue and systemic basis
  - discussion of functional phenomena that make up the disease process as well as regulatory and adaptive mechanisms
  - analysis of diagrams discussing pathophysiological phenomena
2. BASICS OF ELECTROCARDIOGRAPHY, EXERCISES WITH ECG'S
- recognition of ECG waveforms
  - measurement of ECG time and amplitude values
  - determination of the heart's electrical axis
  - calculating the frequency of atrial and ventricular activity
  - features of physiological sinus rhythm
3. PATHOMECHANISMS OF HEART RHYTHMATE DISORDERS, EXERCISES WITH ECG'S
- classification of arrhythmias
  - sinus rhythm disorders
  - premature ventricular and supraventricular agitation
  - supraventricular and ventricular tachycardia, atria fibrillation
  - sinoatrial blocks, atrioventricular blocks, intraventricular blocks
  - teams of pre-excitation
  - Morgagni-Adams-Stockes syndrome
  - effect of electrolytes on cardiac function and ECG recording
4. HEART DEFECTS, CARDIOMIOPATHY, ATHEROSCLEROSIS AND ISCHAEMIC HEART DISEASE PART 1
- congenital and acquired heart defects
  - cardiomyopathies - classification and pathophysiology
  - pathophysiology of atherosclerosis
  - complications of atherosclerosis
  - pathomechanism of myocardial ischemia
  - classification of ischemic heart disease
  - ischemia in the ECG's
5. ISCHAEMIC HEART DISEASE PART 2 AND ACUTE CORONARY SYNDROMES
- pathomechanism of myocardial ischemia
  - acute coronary syndromes, myocardial infarction
  - zone of myocardial infarction with ECG's analysis
  - evolution of myocardial infarction in ECG
  - hemodynamic disorders in myocardial infarction
6. CIRCULATORY INSUFFICIENCY, SHOCK AND HYPERTENSION
- classification and pathophysiology of circulatory insufficiency
  - compensation mechanisms
  - pulmonary edema and pulmonary hypertension
  - definition and pathophysiology of shock, multiple organ failure



- primary and secondary hypertension
- complications of hypertension

7. CREDIT TEST #1 WITH ECG EVALUATION

8. PATHOLOGICAL BLEEDING

- classification of hemostasis disorders and its diagnosis
- pathogenesis of clinical symptoms in hemostasis disorders
- coagulation disorders
- Platelets disorders
- vascular abnormalities

9. TROMBOPHYLIA

- pathomechanism of thrombosis
- syndrome of disseminated intravascular coagulation
- congenital thrombophilia
- acquired thrombophilia, antiphospholipid syndrome
- venous tromboembolic diseases

10. COMPLETE BLOOD COUNT (CBC) – ANEMIA AND POLYCYTHEMIA

- erythropoiesis and its disorders
- anemia and its classification
- polycythemia
- practical analysis of complete blood counts part 1

11. LEUCEMIAS

- granulocyte system diseases
- lymphocyte system diseases
- myelodysplastic syndromes
- practical analysis of blood counts part 2

12. PATHPHYSIOLOGY OF THE DIGESTIVE SYSTEM

- abdominal motor dysfunction
- reflux disease
- gastric secretion
- gastritis
- peptic ulcer of the stomach and duodenum
- Zollinger-Ellison syndrome
- digestive and absorption disorders
- small intestinal diseases
- inflammatory diseases of the large intestine
- diarrhea and their complications

13. PATHPHYSIOLOGY OF THE LIVER AND GALLBLADDER

- gallbladder and bile duct diseases
- cholelithiasis
- jaundices
- inflammation, cirrhosis and liver failure
- liver-kidney syndrome

14. CREDIT TEST #2 WITH EVALUATION OF THE COMPLETE BLOOD COUNT



15. REPETITION

16. PANCREATIC DISORDERS, DIABETES

- basics of sugar and lipid metabolism disorders
- pancreatic pathophysiology
- neuroendocrine tumors
- type 1 diabetes
- type 2 diabetes
- specific cases of diabetes
- metabolic syndrome
- complications of diabetes

17. BASES OF ENDOCRINOLOGY

- regulatory mechanisms in the endocrine system
- primary and secondary disorders of internal secretion
- mechanisms of disorders of the hypothalamic-pituitary system
- pituitary adenomas
- deficiency and excess of vasopressin
- hypopituitarism

18. PATOPHYSIOLOGY OF THYROID GLAND AND PARATHYROID

- struma – definition and classification
- hyperthyroidism, Graves disease
- hypothyroidism
- parathyroid gland and tetany

19. PATHPHYSIOLOGY OF ADRENAL CORTEX

- adrenal insufficiency, Addison's disease
- Cushing's disease and syndrome
- mineralocorticoid secretion disorders, Conn syndrome
- Hypoaldosteronism
- secondary hyperaldosteronism
- adrenal and genital syndrome
- hirsutism

20. CATECHOLAMINS, GONADES, MEN SYNDROMES

- catecholamines and their metabolites
- pheochromocytoma
- MEN syndromes
- menstrual disorders
- polycystic ovary syndrome
- perimenopausal period disorders and menopause
- abnormalities of male gonads
- gynecomastia

21. PATHOPHYSIOLOGY OF URINARY DISEASES

- bases of renal excretion disorders
- acute and chronic renal failure
- pathomechanisms of proteinuria



- renovascular hypertension
- liver and kidney syndrome
- glomeruloneur and interstitial nephritis
- nephrotic syndrome
- urinary tract stones

22. CREDIT TEST #3

23. PATHOPHYSIOLOGY OF RESPIRATORY PART 1

- subjective symptoms in respiratory diseases
- cyanosis and other signs
- basics of respiratory pathophysiology
- type 1 and type 2 respiratory disorders
- basics of gasometry and pulse oximetry
- obstructive and restrictive diseases
- basics of spirometry

24. PATHOPHYSIOLOGY OF RESPIRATORY PART 2

- obstructive and restrictive diseases
- COPD and bronchial asthma
- bronchiectasis
- cystic fibrosis
- acute and chronic respiratory failure and methods of their compensation
- disorders of breathing mechanics
- neurogenic causes of respiratory failure (neuromuscular diseases)

25. WATER AND IONS BALANCE

- dehydration, conduction, edema
- electrolyte disturbances
- hypo- and hyperkalemia
- hypo- and hypernatremia
- hypo- and hypercalcemia
- hypo- and hypermagnesaemia
- hypo- and hyperphosphatemia

26. ACID-BASE EQUILIBRIUM PATHOPHYSIOLOGY

- renal, lung and blood components
- indicators of acid-base disturbances (blood pH, pCO<sub>2</sub>, bicarbonate concentration, buffering bases, anion gap)
- division of acid-base disturbances
- etiopathogenesis and compensatory mechanisms
- general principles of compensating for respiratory and metabolic disorders
- gasometric tests analysis and interpretation

27. VITAMINS, ALCOHOLISM, NERVOUS SYSTEM

- calcium metabolism disorders, osteoporosis
- avitaminosis
- pathomechanisms in alcoholism
- functional disorders in central nervous system diseases (strokes and other focal brain lesions,





multiple sclerosis, neurodegenerative diseases, epilepsy)

- functional disorders in diseases of the peripheral nervous system (polyneuropathy, Guillain-Barré syndrome, myasthenia gravis, SLA)

28. MAIN PHENOMENA AND BASIC CONCEPTS IN PATHOPHYSIOLOGY

29. CREDIT TEST #4 WITH ANALYSIS OF GASOMETRIC TEST

30. REPETITION

**Basic literature** (list according to importance, no more than 3 items)

1. Pathophysiology, L-E.C. Copstead, J.L. Banasik, Elsevier Saunders, 2005.
2. Pathophysiology of Disease 5th edition, S.J. McPhee, Lange Medical Books, 2006.

**Additional literature and other materials** (no more than 3 items)

1. ECG tracings, real results of gasometry, morphology and spirometry

**Didactic resources requirements** (e.g. laboratory, multimedia projector, other...)

laptop, projector, ECG apparatus, board + chalk / felt-tip pens

**Preliminary conditions** (minimum requirements to be met by the student before starting the module/course)

Knowledge on human anatomy, physiology, histology and biochemistry

**Conditions to receive credit for the course** (specify the form and conditions of receiving credit for classes included in the module/course, admission terms to final theoretical or practical examination, its form and requirements to be met by the student to pass it and criteria for specific grades)

1. presence on lectures and seminars - in accordance with the new Regulations of Studies it is necessary to make up all absences in classes, including rector days and dean's hours, while it is possible to make up the absence in the form of a presentation or essay prepared by the student as part of self-study;
2. active participation in classes - positive assessment of initial tests and oral responses during the classes;
3. obtaining positive grades from all four credit tests;
4. passing all practical analyses (ECG, CBC and gasometry);

**Practical final exam:**

correct evaluation and description of the ECG, the complete blood counts and gasometry

**The final theoretical exam:**

one-choice test, 100 questions, exam time - 100 minutes, pass -  $\geq 50\%$  correct answers

<b>Grade:</b>	<b>Criteria for course</b>
Very Good (5.0)	Individual pass the exercises, tests from each chapter (according to the Gaussian distribution curve), practical abilities - practical analyses (ECG, CBC and gasometry)
Good Plus (4.5)	Individual pass the exercises, tests from each chapter (according to the Gaussian distribution curve), practical abilities - practical analyses (ECG, CBC and gasometry)
Good (4.0)	Individual pass the exercises, tests from each chapter (according to the Gaussian distribution curve), practical abilities - practical analyses (ECG, CBC and gasometry)
Satisfactory Plus (3.5)	Individual pass the exercises, tests from each chapter (according to the



	Gaussian distribution curve), practical abilities - practical analyses (ECG, CBC and gasometry)
Satisfactory (3.0)	Individual pass the exercises, tests from each chapter (according to the Gaussian distribution curve), practical abilities - practical analyses (ECG, CBC and gasometry)
<b>Grade:</b>	<b>Criteria for exam (if applicable)</b>
Very Good (5.0)	according to the Gaussian distribution curve
Good Plus (4.5)	according to the Gaussian distribution curve
Good (4.0)	according to the Gaussian distribution curve
Satisfactory Plus (3.5)	according to the Gaussian distribution curve
Satisfactory (3.0)	according to the Gaussian distribution curve

**Name and address of module/course teaching unit, contact: telephone and e-mail address**

Katedra Patofizjologii (Department of Pathophysiology), Marcinkowskiego 1, Wrocław  
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**Coordinator / Person responsible for module/course, contact: telephone and e-mail address**

Prof. dr hab. Witold Pilecki , tel. 602 488 332; [witold.pilecki@umed.wroc.pl](mailto:witold.pilecki@umed.wroc.pl)

**List of persons conducting specific classes: full name, degree/scientific or professional title, discipline, performed profession, form of classes:**

Prof. dr hab. Witold Pilecki (professor of medicine) - lectures  
Dr hab. n. med. Dariusz Kałka (medical doctor) - lectures, classes  
Dr hab. n. med. Tadeusz Sebzda (medical doctor) - lectures, classes  
Dr hab. n. med. Anna Janocha (medical doctor)-lectures, classes  
Dr n. med. Anna Miętka (medical doctor) - lectures, classes  
Dr inż. Lech Kipiński (doctor) - lectures, classes  
Dr n. med. Małgorzata Poręba (medical doctor) - lectures, classes  
Dr n. med. Beata Kaczmarek-Wdowiak (medical doctor) - lectures, classes  
Dr n. med. Monika Pfanhauser (medical doctor) – lectures, classes  
PhD students of the Department of Pathophysiology with the title of doctor - classes, seminars

**Date of Syllabus development**

30.06.2018

**Syllabus developed by**

Witold Pilecki and Lech Kipiński



	<b>Signature of Head of teaching unit</b>
	Uniwersytet Medyczny we Wrocławiu KATEDRA PATOFIZJOLOGII ZAKŁAD PATOFIZJOLOGII
Signature of Faculty Dean	Z.U. prof. dr hab. n. med. Witold Pilecki

Wrocław Medical University  
FACULTY OF MEDICINE  
VICE-DEAN FOR STUDIES IN ENGLISH  
Prof. Andrzej Hendrich, PhD