**Medical University of Warsaw**
**Faculty of Medicine - English Division**
**61 Żwirki i Wigury Street**
**02-091 Warsaw, Poland**

http: // www.wum.edu.pl/

# 2nd YEAR CURRICULUM

**6-year program**

**Warsaw, 2021/2022**

## AUTHORITIES OF MEDICAL UNIVERSITY OF WARSAW – TERM 2020-2024

**Rector** – Professor Zbigniew Gaciong, MD, PhD

**Vice Rector for Student Affairs and Education** – Professor Marek Kuch, MD, PhD

**Vice Rector for Science and Technology Transfer** – Professor Piotr Pruszczyk, MD, PhD

**Vice Rector for Human Resources** – Professor Agnieszka Cudnoch-Jedrzejewska, MD, PhD

**Vice Rector for Clinical Affairs and Investments** – Professor Wojciech Lisik, MD, PhD

**Vice Rector for International Relations, Development and Promotion** – Professor Paweł Włodarski, MD, PhD

**FACULTY AUTHORITIES OF MEDICAL UNIVERSITY OF WARSAW – TERM: 2020-2024**

**Faculty of Medicine** – Professor Rafał Krenke MD, PhD

**English Division – Faculty of Medicine** – Assoc. Prof. Jacek Sieńko, MD, PhD.

## DEAN'S OFFICE

**Head of the Dean's Office** – Magdalena Kawałczewska, MA

**Student Administration Officer (1st, 2nd and 3rd -Year)** – Aleksandra Chilecka

**Student Administration Officer (4th, 5th, 6th -Year)** – Justyna Szczepaniuk, MA

### STUDENT'S GOVERNMANT REPRESENTATIVE:

**President** – Bartholomew Rzepa

**Vice President** – Jannush Nathan

**Secretary** – Mira Odeessa

**Student Rights** – Isabel Jaszewski

**Treasurer** – Chukwudum Igbokwe

**Social Media** – Olivia Gudziewski

**Event Coordinator** – Zoheir Boutaleb, Disha Keshwani

***www:*** *https://edsgwum.wixsite.com/edsg*

### CLASS REPRESENTATIVE:

Aleksandra Frankowska – 2 year

# SCHEDULE – ACADEMIC YEAR 2021/2022

## 6-year program

**WINTER SEMESTER – 01.10.2021 – 20.02.2022**

| | |
|---|---|
| STUDENT'S ACADEMIC CLASSES: | 01.10.2021 – 19.12.2021 |
| | 03.01.2022 – 30.01.2022 |
| WINTER HOLIDAYS: | 20.12.2021 – 02.01.2022 |
| **EXAM SESSION:** | **31.01.2022 – 06.02.2022** |
| DAYS OFF BETWEEN SEMESTER: | 07.02.2022 – 13.02.2022 |
| RETAKE EXAM SESSION: | 14.02.2022 – 20.02.2022 |

**SUMMER SEMESTER – 21.02.2022 – 30.09.2022**

| | |
|---|---|
| STUDENT'S ACADEMIC CLASSES: | 21.02.2022 – 15.04.2022 |
| | 25.04.2022 – 12.06.2022 |
| EASTER HOLIDAYS: | 16.04.2022 – 24.04.2022 |
| DAYS OFF BEFORE EXAM SESSION | 13.06.2022 – 19.06.2022 |
| **EXAM SESSION:** | **20.06.2022 – 10.07.2022** |
| SUMMER HOLIDAYS: | 11.07.2022 – 28.08.2022 |
| RETAKE EXAM SESSION: | 29.08.2022 – 04.09.2022 |
| SUMMER HOLIDAYS: | 05.09.2022 – 30.09.2022 |

Curriculum of 2nd year of 6-year 2021/2022 ED program and the list of contents

2nd year

| page | subject | form of credit | semester | Total no of hours | including | | | | ECTS |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | lecture | seminar | class | practical | |
| 36 | Biochemistry with Elements of Chemistry | exam | 1&2 | 180 | 40 | 50 | 90 | | 17 |
| 5 | Cytophysiology | exam | 1 | 45 | 10 | 10 | 25 | | 2 |
| 12 | Physiology with Pathophysiology | exam | 1&2 | 220 | 65 | 65 | 90 | | 19 |
| 69 | Immunology | exam | 2 | 40 | | 40 | | | 3 |
| 48 | Hygiene and Epidemiology | credit | 1 | 30 | | 10 | 20 | | 2 |
| 63 | Polish for Medicine | credit | 1&2 | 80 | | | 80 | | 5 |
| 58 | Medical Ethics with Elements of Philosophy | credit | 1 | 30 | 18 | 12 | | | 2 |
| 43 | Genetics | credit | 2 | 25 | | 8 | 17 | | 2 |
| 53 | Medical Communication | credit | 2 | 32 | 20 | | 12 | | 1 |
| 30 | Research Methodology | credit | 1 | 35 | 5 | 15 | 15 | | 1 |
| | Optional course | credit | 1&2 | 60 | | 60 | | | 4 |
| | Vocational Training | credit | 2 | 120 | | | | 120 | 4 |
| | | | | 897 | 158 | 270 | 349 | 120 | 62 |

# *Cytophysiology*

| **1. IMPRINT** | |
|---|---|
| **Academic Year** | **2021/2022** |
| **Department** | Faculty of medicine |
| **Field of study** | Medicine |
| **Main scientific discipline** *(in accord with appendix to the Regulation of Minister of Science and Higher education from 26th of July 2019)* | **Medical science** |
| **Study Profile** *(general academic / practical)* | General academic |
| **Level of studies** *(1st level /2nd level/uniform MSc)* | Uniform MSc |
| **Form of studies** | **Full time studies** |
| **Type of module / course** *(obligatory / non-compulsory)* | **obligatory** |
| **Form of verification of learning outcomes** *(exam / completion)* | **exam** |
| **Educational Unit / Educational Units** *(and address / addresses of unit / units)* | **Department of Histology and Embryology**<br>Center for Biostructure Research<br>02-004 Warszawa, Chałubińskiego 5 Str.(Anatomicum bldg.) http://histologia.wum.edu.pl<br>histolog@wum.edu.pl<br>Department office is open for students on working days.<br>Business hours 9: 30 - 14: 00, tel/fax 22 629-5282.<br><br>**Department of Transplantology and Main Tissue Bank**<br>Center for Biostructure Research<br>02-004 Warszawa, Chałubińskiego 5 Str.(Anatomicum bldg.)<br>https://transplantologia.wum.edu.pl<br>Department office is open for students on working days.<br>Business hours 9: 30 - 14: 00, tel./fax 22 621 75 43<br><br>**Department of Methodology:**<br>Preclinical Research Center Bldg. |

| | |
|---|---|
| | 02-091 Warszawa, 1b Banacha Street<br>http://metodologia.wum.edu.pl<br>metodologia@wum.edu.pl<br>Department office is open for students on working days.<br>Business hours 9: 30 - 14: 00 |
| **Head of Educational Unit / Heads of Educational Units** | **Jacek Malejczyk, Ph.D. Professor**<br>**Artur Kamiński, M.D., Ph.D., Associate professor**<br>**Paweł Włodarski, MD, PhD, Professor** |
| **Course coordinator** *(title, First Name, Last Name, contact)* | **Jacek Malejczyk, Ph.D. Professor**<br>**jacek.malejczyk@wum.edu.pl** |
| **Person responsible for syllabus** *(First name, Last Name and contact for the person to whom any objections concerning syllabus should be reported)* | **Jacek Malejczyk, Ph.D. Professor**<br>**jacek.malejczyk@wum.edu.pl** |
| **Teachers** | **Department of Histology and Embryology:**<br>**Jacek Malejczyk, Ph.D., Professor jacek.malejczyk@wum.edu.pl**<br>**Stanisław Moskalewski, M.D., Ph.D., Professor**<br>**stanislaw.moskalewski@wum.edu.pl**<br>**Anna Hyc, Ph.D., Associate professor anna.hyc@wum.edu.p**<br>**Anna Iwan, Ph.D., Associate professor anna.iwan@wum.edu.p**<br>**Izabela Młynarczuk-Biały, M.D., Ph.D., Associate professor**<br>**imlynarczuk@wum.edu.pl**<br>**Łukasz Biały, M.D., Ph.D. lukasz.bialy@wum.edu.pl**<br>**Ewa Jankowska Steifer, Ph.D., Associate professor**<br>**ewa.jankowska@wum.edu.pl**<br>**Justyna Niderla-Bielińska, Ph.D., Associate professor**<br>**justyna.niderla@wum.edu.pl**<br>**Aneta Ścieżyńska, Ph.D. aneta.sciezynska@wum.edu.pl**<br>**Ilona Kalaszczyńska, Ph. D. ikalaszczynska@wum.edu.pl**<br><br>**Department of Transplantology and Main Tissue Bank:**<br>**Artur Kamiński, M.D., Ph.D., Associate professor artur.kaminski@wum.edu.pl**<br>**Izabela Uhrynowska-Tyszkiewicz, M.D., Ph.D. iuhrynowska@wum.edu.pl**<br><br>**Department of Methodology:**<br>**Paweł Włodarski, M.D., D.D.S., Ph.D., Professor pawel.wlodarski@wum.edu.pl** |

## 2. BASIC INFORMATION

| | | | |
|---|---|---|---|
| **Year and semester of studies** | 2 year, 1st semester | **Number of ECTS credits** | 2 |

| FORMS OF CLASSES<br>**Contacting hours with academic teacher** | **Number of hours** | **ECTS credits calculation** |
|---|---|---|
| Lecture (L) | 10 | 0,25 |
| Seminar (S) | 10 | 0,25 |
| Discussions (D) | 25 | 1 |

| | | |
|---|---|---|
| e-learning (e-L) | | |
| Practical classes (PC) | | |
| Work placement (WP) | | |
| **Unassisted student's work** | | |
| Preparation for classes and completions | **15** | 0,5 |

| **3.** **COURSE OBJECTIVES** | |
|---|---|
| O1 | |
| O2 | |
| O3 | |

**4.** **STANDARDS OF LEARNING – DETAILED DESCRIPTION OF EFFECTS OF LEARNING** *(concerns fields of study regulated by the Regulation of Minister of Science and Higher Education from 26 of July 2019; does not apply to other fields of study)*

| **Code and number of effect of learning in accordance with standards of learning** *(in accordance with appendix to the Regulatio of Minister of Science and Higher education from 26th of July 2019)* | **Effects in time** |
|---|---|
| **Knowledge – Graduate* knows and understands:** | |
| **B.W7** | physicochemical and molecular basis of the functioning of sensory organs |
| **B.W11** | structure of lipids and polysaccharides and their roles in cellular and extracellular structures; |
| **B.W13** | functions of nucleotides in the cell, the structure of I and II DNA and RNA and the structure of chromatin; |
| **B.W14** | functions of the genome, transcriptome and human proteome and the basic methods used in their study; processes of replication, repair and recombination of DNA, transcription and translation and degradation of DNA, RNA and proteins; knows the concepts of the gene expression regulation; |
| **B.W17** | ways of communication between cells, as well as between the cell and the extracellular matrix and the pathways of transmitting signals in the cell and examples of disruption of these processes leading to cancer and other diseases; |
| **B.W18** | processes, such as the cell cycle, proliferation, differentiation and aging of cells, apoptosis and necrosis, as well as their importance for the functioning of the organism; |
| **B.W19** | basic aspects associated with stem cells and their medical use; |

| | |
|---|---|
| **B.W23** | the mechanisms of aging of the body; |
| **C.W4** | structure of chromosomes and the molecular basis of mutagenesis; |
| **C.W51** | mechanism of hormone activity |
| **Skills– Graduate* is able to:** | |
| **B.U13** | plan simple research and interpret the results and draw conclusions. |

** In appendix to the Regulation of Minister of Science and Higher education from 26th of July 2019 „graduate", not student is mentioned.*

**5. ADDITIONAL EFFECTS OF LEARNING** *(non-compulsory)*

| **Number of effect of learning** | **Effects of learning i time** |
|---|---|
| **Knowledge – Graduate knows and understands:** | |
| K5 | perceiving and recognizing own limitations and self-assessment of deficits and educational needs |
| K7 | readiness to use objective sources of information |
| **Skills– Graduate is able to:** | |
| S1 | |
| **Social Competencies – Graduate is ready for:** | |
| SC1 | |

**6. CLASSES**

| **Form of class** | **Class contents** | **Effects of Learning** |
|---|---|---|
| **Lectures** | W1 Methods of DNA analysis – from Crichton to Crick<br>W2 Monoclinal antibodies in diagnostics and therapy<br>W3 Cholesterol<br>W4 DNA repair<br>W5 RNA interference<br>W6 Proteasomes and ubiquitin in medicine<br>W7 Cytokines in health and disease<br>W8 Mitochondria – not only the source of energy<br>W9 Metaplasia and endothelial to mesenchymal transition<br>W10 Mechanisms of inflammation | **B.W7;**<br>**B.W11;**<br>**B.W13;**<br>**B.W14;**<br>**B.W17;**<br>**B.W18;**<br>**B.W19;**<br>**B.W23;**<br>**C.W4;**<br>**C.W51;** |
| **Seminars (S) and Classes ( C)** | ***S1. Physiology of selected cytoplasmic processes.***<br>*Physiology of cell membranes. Structure of lipids and their function In the cell and extracellular matrix. Lipids rafts. Caveolae. Asymmetry of the plasma membrane. Cellular transport. Glucose transporters. ABC transporters and MDR* | **B.W7;**<br>**B.W11;**<br>**B.W13;** |

| | | |
|---|---|---|
| | *phenomenon.Physicochemical amd molecular aspects of* of perception of the organ of the hearing.<br>***C1. Structure and function of cytoplasm and cell membranes***<br>*Physiology of membrane enclosed compartment. Physiology of selected cytosolic processes. Ribosomes, Polisomes. Endo and exocytosis pathways. Interactions between cells and extra-cellar matrix. Cytoskeleton.*<br><br>***S2. Cytophysiology of Cell nucleus and function.***<br>*Structure of the cell nucleus. Structure of chromatin and its modifications. Tissue specific modifications of chromatin. Transcriptional activity of chromatin. RNA interference Chromosomes. Telomers. Nuclear structures involved in RNA processing.*<br>***C2. Structure of nucleus****.*<br>*Nucleolus- structure and function. Nuclear envelope and nuclear-cytoplasmic transport. Nuclear processes before cell division. RNA interference.*<br><br>***S3. Cell to cell communication.***<br>*Types of communication between cells in the human body. The answer of cells to extracellular stimuli.* Molecular basis of sense perception and signal transmission in receptor cells.<br>***C3. Cell signalling – intracellular pathways.***<br>*Receptors, second messengers (cAMP, cGMP, Ca2+. IP3, DG at al.), transcription factors (general and specific – ie. CREB, AP-1, NFkB ). Structure and function of G-proteins. Receptor and non-receptor tyrosine kinases. Kinases Src, Jak. MAP, Akt, PI3K pathways.*<br><br>***S4. Cell signalling events***<br>*Cell signalling by selected hormones, cytokines, growth factors and extra-cellar matrix components. Pathways activated by insulin, steroid hormones, nitric oxygen.*<br>***C4. Clinical aspect of cell signalling***<br>*Abnormalities in the cell signalling in human diseases. Cell signalling pathways as a therapeutic target.*<br><br>***S5. Cell proliferation.***<br>*Types of cell division; mitosis, meiosis. Cell cycle. Structure and function of mitotic spindle. Karyo- and cyto- kinesis.*<br>***C5. Regulation of the cell cycle***<br>*Cyklins i CDKinases. Role of p53, p21. pRb, Cdc25, Cdc6, APC-complex. Action of drugs interfering with cell division.*<br><br>***S6. Cell senescence and aging***<br>*Cellular senescence. Replication senescence. Cell death: apoptosis, necrosis and other types of cell death.*<br>***C6. Cell death***<br>*Apoptotic pathways. Execution of apoptosis. Caspases. Apoptosis without caspases. Physiological apoptosis. Apoptosis induction as a therapeutic target. Methods of detecting of apoptotic cells.*<br><br>***S7. Cell differentiation***<br>*Mechanism of cell differentiation. Genes involved in Cell differentiation. Epigenetic mechanisms. Cell differentiation during embryogenesis and tissue regeneration.*<br>***C7. Stem cells.***<br>*Cell potency. Stem cells, progenitor cells. Cell differentiation of stem cells in the human body.*<br><br>***S8. Mechanisms of oncogenesis***<br>*Protective cellular mechanisms against cancer transformation. Abnormal gene expression in cancer. Role of p53, p21, Rb, onco mi-RNA. ATM/ATR, BRCA1/2.*<br>***C8. Caner transformation***<br>*Malignant transformation on the example of retinoblastoma, colon cancer, breast cancer, lung cancer, chronic myeloid leukaemia.* | **B.W14;**<br>**B.W17;**<br>**B.W18;**<br>**B.W19;**<br>**B.W23;**<br>**C.W4;**<br>**C.W51;**<br>**B.U13;**<br>**K5**<br>**K7** |

| | | |
|---|---|---|
| | ***S9. Cancer cell biology***<br>*Cancer cells properties. Abnormalities in cellar processes in cancer cells. Abnormal cell growth. Models of cancer evolution. Cancer stem cell theory. Tumor progression. Tumor angiogenesis. Cancer cell – extracellular matrix interactions and metastasis.*<br>***C9. Molecular cancer therapy***<br>*Cellular target of anticancer drugs incl. molecular targets of novel drugs in oncology.*<br><br>***S10. Regenerative medicine and tissue bio- engineering.***<br>*Cells in regenerative medicine. Stem cells – embryonic and somatic. Differenciated cells: autologenic, izogenic (syngenic), allogenic, xenogeneic, primary and secondary. Method of stem generation: embryonic, somatic and induced stem cells. Therapeutic cloning.*<br>***C10. Cell therapy***<br>*Stem cell therapy possibilities in clinical usage.*<br><br>***C11. Methods of cell culture and techniques used in the medical research***<br>*Methods of cell culture for medical research and regenerative medicine. The in vitro experiment on cell cultures. Types of the cell cultures. Cytostatic/cytotoxic tests in a drug discovery. Laboratory methods of cell research in medicine.*<br><br>***C12. Tissue and cell banking for medical proposes.***<br>*Rules of tissue and cell banking. Qualification of donors of tissues and cells. Organisation of tissue and cell banking in Poland, EU at the word. Types of transplantation. Clinical usage of transplants. Coordination 2f tissue and cell transplantation. Advanced technology medical products (ATPM) in tissue and cell banking. Types of the scaffolds and cells in tissue engineering. Transplantation in a regenerative medicine.* | |

## 7. LITERATURE

**Obligatory**

1. Essential Cell Biology by. Alberts at all (ed.)
2. Medical Cell Biology by Goodman (ed.)
3. **Rewiew:** Cell and Molecular Biology Lippincott's illustrated Review by Chandar, Viselli

**Supplementary**

1. Molecular Cell Biology by Albers et all (ed.)
2. Cell Biology by Karp
3. The cell – a molecular approach by Cooper, Hausman

## 8. VERIFYING THE EFFECT OF LEARNING

| Code of the course effect of learning | Ways of verifying the effect of learning | Completion criterion |
|---|---|---|
| **B.W7; B.W11; B.W13; B.W14; B.W17; B.W18; B.W19; B.W23; C.W4; C.W51;** | *Weekly test, examination* | *60%* |
| **B.U13; K5; K7** | *observation by the teacher during the classes* | *credit from the teacher* |

**9. ADDITIONAL INFORMATION** *(information essential for the course instructor that are not included in the other part of the course syllabus e.g. if the course is related to scientific research, detailed description of, information about the Science Club)*

**Regulations of classes in Cytophysiology for students of medicine:**

**Organization of classes**

1.The classes begin with a seminar part where presence is obligatory.
2. Presence on practical classes and seminars is obligatory. Delays exceeding 15 minutes will be treated as absence.
3. Students enter the classes prepared essentially. The scope of material for classes is given in the "Program of classes".
4. Preparation of students for classes is assessed by the teacher.
5. During the classes, students answer questions, discuss issues covered by the subject of classes and view microscopic preparations, diagrams and electronograms.

**Credit for classes – weekly tests.**

1. The condition for crediting is participation in classes and seminars, passing all classes and weekly tests
2. The condition for passing the class (practical and seminar) is the presence on both parts of the class and obtaining a positive assessment of the knowledge of the material provided for the given occupation in the person conducting the practical part.
3. The days in which the dates of the classes are set are the days of obligatory classes.
4. Due to the character and organization of seminars and practical classes there is no possibility to make up for absences. Absence at 3 or more classes, regardless of the reason, results in not getting a credit for the semester, hence student will not be admitted to the examination.
5. In order to get a credit for classes, the student must get at least 60% of the total number of points from all weekly tests.
6. If the student did not achieve 60%, she/he must get credit for all the tests for the classes for which he did not get 6 points. Not getting the minimum of 60% from all the retaken tests, results in not being admitted to the final examination.
7. All tests needs to be retaken before final examination.

**Final examination**

1. The final exam takes the form of a test. Test contains 50 multiple choice questions (with more than one answer correct) and the test duration is 38 minutes. Electronic test examinations are held in the building of Main Library in the computer room.
2. The criteria for passing the exam are determined by the Head of the Department after the test, but it is assumed that at least 60% of the correct answers in the test are required.
3. Students may evaluate their paper immediately after the quiz is finished. Then, if any reservations arise, students can make the complaint and send it to the Department e-mail address: **histolog@wum.edu.pl .** Complaints are only accepted up to one hour after the test. Later complaints will not be accepted..
4. In the case of absence from the exam caused by health reasons, the student is required to provide a medical certificate within three working days of the date of the examination, under pain of entering the unsatisfactory grade.
5. In the event of failing the retake examination, at the student's request, the Dean may set a board examination.

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Position of the Chair regarding cheating during examinations

Cheating on examinations is a breach of ethics and Regulations of Studies at the Warsaw Medical University. Person actively or passively participating in cheating shall be punished by being expelled from the examination and receiving a failing mark. On the top of that, the Department shall institute disciplinary procedure against the cheating students.

Person actively participating in cheating is the one, who copies results from other students or uses illegal notes or electronic devices to communicate or store data. Bringing such devices to examinations is forbidden.

Passive participation in cheating means allowing other students copy one's own responses. Thus, a student is obliged to behave honestly, not to allow other students copy his/her own responses.

Head of the Department obliges students and examiners to strictly obey these regulations

Signature of the Head of the Unit

Signature of the person responsible for the syllabus

# Physiology with pathophysiology elements

| 1. IMPRINT | |
|---|---|
| **Academic Year** | 2021/2022 |
| **Department** | Faculty of Medicine |
| **Field of study** | Medicine |
| **Main scientific discipline** *(in accord with appendix to the Regulation of Minister of Science and Higher education from 26th of July 2019)* | **Medical science** |
| **Study Profile** *(general academic / practical)* | General academic |
| **Level of studies** *(1st level /2nd level/ uniform MSc)* | Uniform MSc |
| **Form of studies** | **full time studies** |
| **Type of module / course** *(obligatory / non-compulsory)* | **obligatory** |
| **Form of verification of learning outcomes** *(exam / completion)* | **exam** |
| **Educational Unit / Educational Units** *(and address / addresses of unit / units)* | a). Chair and Department of Experimental and Clinical Physiology (1MA)<br><br>ul. Pawińskiego 3c<br>**02-106 Warszawa** |

| | |
|---|---|
| **Head of Educational Unit / Heads of Educational Units** | **a) prof. Agnieszka Cudnoch-Jędrzejewska, MD PhD** |
| **Course coordinator** *(title, First Name, Last Name, contact)* | **Kaja Kasarełło, PhD**<br>**Michał Kowara, MD, PhD** |
| **Person responsible for syllabus** *(First name, Last Name and contact for the person to whom any objections concerning syllabus should be reported)* | **Michał Kowara, MD, PhD** |
| **Teachers** | Prof. Agnieszka Cudnoch-Jedrzejewska, MD, PhD; Kaja Kasarełło PhD, Michał Kowara, MD, PhD; Tymoteusz Żera, MD, PhD; Małgorzata Wojciechowska, MD, PhD; Katarzyna Kamińska, PhD; Anna Zalewska-Żmijewska, MD, PhD; Longin Niemczyk, MD, PhD; Emilian Snarski, MD, PhD; Katarzyna Romanowska-Próchnicka, MD, PhD; Sonia Borodzicz-Jażdżyk, MD, PhD; Anna Płatek, MD, PhD; Kinga Jaworska, MD, PhD; Michał Skrzycki, PhD; Jagoda Kruszewska, MD; Jacek Dziedziak, MD; Tomasz Ciesielski, MSc; Michał Proczka, MD; Piotr Konopelski MD; |

## 2. BASIC INFORMATION

| | | | |
|---|---|---|---|
| **Year and semester of studies** | 2nd year, 3 and 4 semester | **Number of ECTS credits** | 19.00 |

| FORMS OF CLASSES<br>**Contacting hours with academic teacher** | **Number of hours** | **ECTS credits calculation** |
|---|---|---|
| Lecture (L) | 65 | 3 |
| Seminar (S) | 65 | 1 |
| Classes (C) | 90 | 8 |
| e-learning (e-L) | | |
| Practical classes (PC) | | |
| Work placement (WP) | | |
| **Unassisted student's work** | | |
| Preparation for classes and completions | 280 | 7 |

## 3. COURSE OBJECTIVES

| | |
|---|---|
| O1 | Explain physiological mechanisms by applying basic principles of physics and chemistry |

| | |
|---|---|
| O2 | Describe the fundamental mechanisms underlying normal function of cells, tissues, organs, and organ systems of the human body, commensurate with the requirements for a physician providing primary care to patients. |
| O3 | Explain the basic mechanisms of homeostasis by integrating the functions of cells, tissues, organs, and organ systems. |
| O4 | Apply knowledge of functional mechanisms and their regulation to explain the pathophysiology underlying common diseases. |

**4.** **STANDARDS OF LEARNING – DETAILED DESCRIPTION OF EFFECTS OF LEARNING** *(concerns fields of study regulated by the Regulation of Minister of Science and Higher Education from 26 of July 2019; does not apply to other fields of study)*

| **Code and number of effect of learning in accordance with standards of learning** *(in accordance with appendix to the Regulation of Minister of Science and Higher education from 26th July 2019)* | **Effects in time** |
|---|---|
| **Knowledge – Graduate* knows and understands:** | |
| B.W1 | water-electrolytes homeostasis in biological systems |
| B.W2 | acid-base balance, functions of buffer solutions and their role in homeostasis |
| B.W3 | definitions of: solubility, osmotic pressure, isotonicity, colloid solutions and Gibbs-Donnan effect |
| B.W7 | physicochemical and molecular basis of the functioning of sensory organs |
| B.W16 | metabolic profiles of the main organs and systems |
| B.W20 | action potential, synaptic transmission and maintenance of nerve function, striated and smooth muscles function and blood function |
| B.W21 | regulatory mechanisms of all organs and systems in human body including: circulatory system, respiratory system, alimentary system, urinary system and skin; relationship between these mechanisms |
| B.W22 | physiology and regulation of reproductive functions of women and men |
| B.W23 | mechanisms of aging of the body |
| B.W24 | main quantitative parameters describing the capacity of particular systems and organs, including scopes of the standard and demographic factors affecting values of such parameters |
| B.W25 | relationship between factors dysregulating homeostasis and physiological as well as pathophysiological changes |
| C.W6 | genetic conditions of human blood groups and the Rhesus incompatibility |
| C.W27 | basic mechanisms of cell and tissue damage |
| C.W29 | definition and pathophysiology of shock, especially the differential diagnosis of shock and multiorgan failure |
| C.W30 | etiology of hemodynamic disorders, regressive and progressive changes |

| | |
|---|---|
| C.W32 | consequences of pathological processes at certain localization in the organism to surrounding organs |
| C.W33 | external and internal disease agents, modifiable and non-modifiable |
| C.W34 | clinical forms of the most frequent diseases of particular systems and organs, metabolic diseases, as well as water, electrolyte and acid-base balance disturbances |
| C.W45 | symptoms of the most common acute intoxications, including intoxication with alcohol, drugs and other psychoactive substances, heavy metals and selected groups of medicines |
| C.W47 | influence of oxidative stress on cells and its impact on pathogenesis of diseases and in aging processes |
| C.W48 | consequences of deficiency or excess of vitamins and minerals in human organism |
| C.W49 | enzymes participating in digestion, mechanism of hydrochloric acid production in the stomach, the role of bile, the course of digestion products' intestinal absorption |
| C.W50 | consequences of improper nutrition, including long-term starvation, oversized meals, unbalanced diet as well as disorders of digestion and absorption of digestion products |
| C.W51 | mechanism of hormone activity |
| **Skills– Graduate* is able to:** | |
| B.U1 | use the knowledge of the laws of physics to explain the effects of external factors such as temperature, acceleration, pressure, electromagnetic fields and ionizing radiation on the body and its components |
| B.U7 | perform simple functional tests assessing human body as a stable regulatory system (stress tests, exercise tests) and interpret numerical data on basic physiological variables |
| B.U9 | use simple measuring instruments and evaluate the accuracy of performed measurements |
| C.U11 | associate the images of tissue and organ damage with the clinical symptoms of the disease, history and laboratory test results |
| C.U20 | describe changes in the functioning of the body in the event of disturbed homeostasis, in particular define its integrated response to physical exertion, exposure to high and low temperature, loss of blood or water, sudden upright standing, transition from sleep to wakefulness |

** In appendix to the Regulation of Minister of Science and Higher education from 26th of July 2019 „graduate", not student is mentioned.*

| **5. ADDITIONAL EFFECTS OF LEARNING** *(non-compulsory)* | |
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| **Number of effect of learning** | **Effects of learning i time** |
| **Knowledge – Graduate knows and understands:** | |
| K1 | |
| K2 | |
| **Skills– Graduate is able to:** | |
| S1 | |
| S2 | |

| Social Competencies – Graduate is ready for: | |
|---|---|
| SC1 | |
| SC2 | |

**6. CLASSES**

| Form of class | Class contents | Effects of Learning |
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| Seminar and classes | **Week 1: Cell physiology. Neurons.**<br>Cell physiology and pathophysiology. Neural cell. Extracellular and intracellular fluid composition. Cellular membrane properties and functions, membrane transport. Ion channels function and classification. Sodium-potassium pump. Donnan equilibrium. Resting potential. Equilibrium potential for potassium ions. Characteristics of potassium channels responsible for the resting potential. Threshold potential. Action potential. Equilibrium potential for sodium ions. Characteristics of ion channels participating in different phases of the action potential. Differences between resting and action potential in different excitable cells. Channelopathies.<br>Neuron and its properties. Functional and structural classification of neurons. Definitions of the terms: stimulus, excitability, excitation, nerve impulse. Peripheral nerve structure, types and characteristics of nerve fibers. Nerve fibers classification. Mechanism of conduction across nerve fibers. Saltatory and continuous conduction. Factors affecting conduction velocity across nerve fiber. Dendritic networks and their function. Classification of synapses. Mechanism of neurotransmitters release – synaptic vesicle cycle. Synaptic plasticity, synaptic turnover, factors affecting synaptogenesis. Nerve regeneration. | B.W3, B.W20, B.W21 B.U1 |
| Seminar and classes | **Week 2: Brain neurotransmission systems. Autonomic nervous system.**<br>Brain neurotransmission systems. Acetylcholine, catecholamines, serotonine, excitatory and inhibitory aminoacids. Nitric oxide – synthesis and deactivation. Localization of neurons generating certain types of neurotransmitters. Neurotransmitters projections in central nervous system. Co-transmitters. Pre- and postsynaptic receptors. The role of neurotransmitters in regulation of physiological processes and emotional reactions. Psychoactive drugs influence on neurotransmission pathways.<br>Autonomic nervous system. Division of autonomic nervous system. Neurotransmitters. Ganglia of autonomic nervous system. Excitatory and inhibitory transmission in autonomic ganglia. Plasticity of autonomic ganglia. Sympathetic part – centers of sympathetic system, preganglionic sympathetic neurons, sympathetic synaptic endings. Parasympathetic part – centers of parasympathetic system, preganglionic parasympathetic neurons, parasympathetic synaptic endings. Autonomic system impact on certain tissues and organs. Atropine, muscarine and phosphoroorganic compounds intoxication. Horner syndrome. Excessive sweating syndrome. | B.W20, B.W21, B.U1, C.W45 |

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| Seminar and classes | **Week 3: Physiology and motor system I. Physiology and pathophysiology of skeletal muscles and cardiac muscle.**<br><br>Muscular fibers classification and structure. Structural differences between skeletal, cardiac and smooth muscle cells. Calcium channels. The role of ion channels in muscle cell contraction. Skeletal muscles – motor unit, neuromuscular synapse, sarcomere construction, electromechanical coupling. Types of contractions – single, tetanic, isotonic, isometric and auxotonic. Muscle contraction force and its regulation. Hill's equation. Metabolic division of skeletal muscles. Smooth muscles – structure, mechanism of contraction. Electromyography. Clinical effects of muscle contractility lesions (palsy, atrophy), influence on respiratory, circulatory and musculoskeletal system. | B.W20, B.W21, B.U1, B.U9, C.U11 |
| Seminar and classes | **Week 4: Physiology and motor system II. Regulation of muscular tension. Spinal reflexes. Supraspinal regulation of motor activity. Vestibular system. Bulbar, pontine and mesencephalic areas controlling the movement. Motor cortex. Basal ganglia. Cerebellum.** Receptors of musculoskeletal system. Somatosensory and motor innervation of skeletal muscles. Spinal motor neurons. Renshaw's cells – negative feedback loops. Spinal reflexes – stretch reflex, Golgi tendon reflex (inverse stretch reflex), withdrawal reflex. Muscular tension control through proprioceptive reflexes. Gamma motor neurons in regulation of muscular tension. Eliciting spinal reflexes. Reflex disturbances in neurological examination. Structure and function of vestibular system. Function of semicircular canals. Function of saccule and utricle. Vestibular system nervous connections. Vestibular nuclei. Vestibulospinal system. Muscular tension and body equilibrium regulation by vestibular system. Interaction between vestibular and ocular systems – vestibulo-ocular reflex. Post rotational and optokinetic nystagmus. Symptoms and clinical signs of vestibular system lesion. Function of bulbus, pons and mesencephalon in regulation of motor functions. Somatosensory and motor cortex. Organization of neurons in motor cortex and their connection with other cortical areas. Steps of movement generation. Descending motor pathways: corticospinal tracts, bulbospinal tracts. Regulation of motor function by basal ganglia (putamen, caudate nucleus). Mechanism of planning and execution of voluntary movements. Organization and function of cerebellum. Functional division of cerebellum. Organization of neurons in cerebellum cortex. Cerebellum connections. Role of cerebellum in maintenance of body posture, regulation of muscular tension and coordination of voluntary movements. | B.W20, B.W21, B.U1, B.U7, B.U9 |
| Seminar and classes | **Week 5: Pathophysiology of motor system**<br>Pre- and postsynaptic disturbances of neuromuscular junction (myasthenia gravis, Lamber-Eaton syndrome, botulism). Myopathies. Channelopathies of striates muscles. Multiple sclerosis. Pyramid tracts lesion. Pathophysiology of selected extrapyramidal system diseases: Parkinson's disease, Huntington's disease, hemiballismus, essential tremor, cerebellar ataxia. Decerebration. Pathological nystagmus. Motion sickness. | B.W20, B.W21, B.U1, B.U7, B.U9, C.W27, C.W32, C.W33, C.W34, |
| Seminar and classes | **Week 6: Physiology and pathophysiology of sensory system. Sensation. Physiological and pathological pain.** | B.W20, B.W21, B.W25,B.U1 |

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| | Sensation. Classification of sensory stimuli. Sensory signal coding, sensory stimulus transduction into electrical signal. Sensory neuron receptive area. Sensory fibers classification. Somatic sensation. Exteroreceptors, interoreceptors and thermoreceptors – classification, structure and mechanism of action. Extero- and proprioceptive pathways. Sensory areas in cerebral cortex. Somatosensory cortex. Sensory integration.<br>Pain. Definition of pain and classification. Nociceptive and neuropathic pain. Nociceptors (pain receptors). Sensory fibers transmitting pain stimuli (fast and slow pain). Pathways of pain sensation. Neurotransmitters and neuromodulators participating in pain transmission on the levels of I, II and III neurons. Descending antinociceptive system – cerebral centers and main neurotransmission systems participating in pain modulation. Opioid receptors. Pain inhibition on the level of nociceptors. Pain inhibition on spinal level (spinal gate). Lesion of peripheral sensory nerves and posterior radices. Lesions of sensory pathways on the level of spinal cord, brainstem and thalamus. Somatosensory cortex lesions. Lesions of sensory integration, autism and Asperger syndrome. Pathological pain, central and peripheral sensitization. Congenital analgesia. Principles of pain treatment: analgetic ladder. Opioids in treatment of acute and chronic pain. | |
| Seminar and classes | **Week 7: Physiology and pathophysiology of sensory system. Sensation. Physiological and pathological pain.**<br>Vision. Eye structure. Intraocular pressure and responsible mechanisms in physiological and pathological conditions. Photoreception and phototransduction. Retinal ganglia cells receptive areas (eye resolving power). Lateral inhibition phenomena. Eye adaptation to light and darkness. Color vision. Visual field (stereoscopic vision). Vegetative eye innervation (eye accommodation, regulation of pupil size – mydriasis and myosis). Consensual reaction to light, accommodation and convergence. Ocular muscles innervation and eye movements. Organization of visual pathways and centers. Importance of visual system in sensory, motor and equilibrium system integration. Eye refractive errors – nearsightedness (myopia), farsightedness (hyperopia), astigmatism. Vision blurring and color vision deficiency. Visual field defects and other signs of optical tract lesion. Stereo blindness.<br><br>Hearing. External, middle and internal ear structure. Acoustic waves reception and sounds frequency. Mechanisms of sound coding in internal ear. Auditory tracts. Auditory cortex. Hearing tests (audiometry). Tuning fork tests. Receptive and conductive deafness. Causes and results of hearing defects.<br><br>Smell. Structure and function of olfactory cells. Receptor proteins. Olfactory tracts and olfactory areas. Smell loss in diseases and pathological syndromes.<br><br>Taste. Structure and function of gustatory cells. Gustatory pathways. Loss of taste. | B. W7, B.U1, B.U9 |

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| Seminar and classes | **Week 8: Biological rhythms. Physiology and pathophysiology of sleep and wake. Bioelectric activity of brain (EEG). Limbic system organization. Physiology of behavior. Learning and memory.** Definition and types of biological rhythms, biological rhythms synchronization, biological clock. Neurophysiological mechanism of physiological and psychic circadian rhythms control. Definition of sleep. Diurnal rhythmicity of sleep and wake. Role of reticular system in regulation of sleep and wake. Examination of cerebral bioelectric activity by electroencephalography (EEG). Stages of sleep in human. Characteristics and physiological meaning of REM and NREM sleep. Pathophysiology of biological rhythms disturbances – jet lag. Sleep deprivation, narcolepsy, somnambulism. EEG record abnormalities. Epilepsy and its types. Characteristics of limbic system. Function of prefrontal cortex. Congenital behavior: unconditional reflex, instinct, imprinting, impulse. Penalty and reward system. Regulation of mood. Definition of learning and memory. Division and types of memory. Views on the essence of the trace of memory. Anatomy of memory. Chronic excitation and chronic synaptic depression. Methods of concentration and memorizing assessment. Retrograde and anterograde amnesia. Results of prefrontal cortex, hippocampus and surrounding temporal lobes damage. Results of amygdala damage. Pathophysiology of mood disturbances and psychosis (depression syndromes, bipolar disorder, schizophrenia). Amnestic syndromes (Alzheimer's disease, vascular dementia). | B.W20, B.W24, B.W25, B.U9, C.W32, C.W33, C.W34, C.U11, C.U20 |
| Seminar and classes | **Week 9: Summary of the 1st Block** | B.W3, B.W7, B.W20, B.W21, B.W24, B.W25, B.U1 B.U7, B.U9, C.W227, C.W32, C.W33, C.W34, C.W45, C.U11, C.U20 |
| Seminar and classes | **Week 10: 1st Midterm** – themes from the 1st Block. | B.W3, B.W7, B.W20, B.W21, B.W24, B.W25, B.U1 B.U7, B.U9, C.W27, C.W32, C.W33, C.W34, C.W45, C.U11, C.U20 |
| Seminar and classes | **Week 11: Physiology and pathophysiology of blood.** Blood composition. Blood proteins and their functions. Role of erythropoietin. Structure and functions of erythrocytes. Classification of leukocytes. Functions of platelets. Iron turnover. Hemoglobin – types and characteristics, hemoglobin dissociation curve. Gas composition in the atmospheric air, alveolar air as well as in the arterial and venous blood. Total content of oxygen in the blood, arteriovenous difference. Oxygen and carbon dioxide transport in blood. Main blood groups. Hemostasis – role of endothelium, platelets and coagulation factors. Anticoagulation systems preventing from spontaneous clotting. Fibrinolysis. Clinical markers of hemostasis – bleeding time, clotting time, prothrombin time. Basic diagnostic tests – erythrocyte sedimentation rate (ESR), hematocrit, resistance of erythrocytes to hemolysis – application. Blood groups systems. Alterations in red cells system – anemias, polycythemias. Hemoglobinopathies. Hemochromatosis. Alterations in white cells system – leukocytosis, leukopenia. Hemostatic disturbances. Main serological conflicts. | B.W21, B.W24, B.W25, B.U1, B.U7, B.U9, C.W6, C.W27, C.W32, C.W33, C.W34, C.W48, C.W50, C.U11, C.U20 |

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| Seminar and classes | **Week 12: Physiology of cardiovascular system I. Hemodynamics of the heart. Cardiac muscle contraction force regulation. Principles of blood circulation.**<br>Types of myocardial cells. Myocardial working cells specificity. Phases of cardiac cycle. Pressure distribution in heart chambers in individual phases of cardiac cycle. Tones and murmurs of the heart. Main cardiac hemodynamics parameters – end-diastolic and end-systolic volume, stroke volume, cardiac output, ejection fraction, contraction frequency. Preload and afterload. Regulation of cardiac muscle contraction – contractility (homeometric regulation), Frank-Starling law (heterometric regulation). Influence of afterload on muscle shortening velocity (Hill's equation). Functional division of circulatory system. Structure of arterial and venous vessels. Factors conditioning arterial and venous vessels diameter. Principles of blood flow in vessels – blood flow continuity principle, Poiseuille's law. Basic hemodynamic terms – cardiac output, systolic blood pressure, diastolic blood pressure, mean arterial pressure, pulse pressure, total peripheral resistance. Arterial and venous pulse. Venous return. Association between atrial pressure, cardiac output and venous return. | B.W16, B.W20, B.W21, B.W23, B.W24, B.W25, B.U1, B.U7, B.U9, |
| Seminar and classes | **Week 13: Physiology of cardiovascular system II. Nervous and humoral regulation of cardiovascular system activity. Sympathetic and parasympathetic innervation of the heart. Innervation of arteries and veins. Pre- and postsynaptic receptors and neurotransmitters.**<br>Influence of autonomic system on cardiac activity (ino-, chrono- and dromotropic effects). Influence of autonomic nervous system on arteries and veins diameter. Definition of the "set-point" of blood pressure. Regulation of the blood pressure: short-term – baroreceptor reflex, long-term – renin-angiotensin-aldosterone-natriuretic peptide plasma system. Orthostatic reaction. Circulatory reflexes – cardiopulmonary mechanoreceptors reflex, arterial chemoreceptors reflex, Bezold-Jarisch reflex, Bainbridge reflex, diving reflex. Valsalva maneuver (stages and meaning). Blood pressure "set-point" changes during visceral and cutaneous pain, carotid sinus syndrome, brain hypoxia, increase of intracranial pressure (Cushing's sign), changes in oxygen and carbon dioxide level in arterial blood. Orthostatic hypotension. | B.W16, B.W20, B.W21, B.W23, B.W24, B.W25, B.U1, B.U7, B.U9, C.U20 |
| Seminar and classes | **Week 14: Physiology of cardiovascular system III. Principles of electrocardiography.**<br>Functional characteristics of fast and slowly depolarizing cells. Origin of functional potential in fast and slowly depolarizing cells. Structure and properties of heart conduction system. Sinus rhythm. Physical and electrophysiological basis of electrocardiography. Electrocardiographic leads. Waves, segments and intervals in electrocardiography – mechanism of generation. Defibrillation and electrical cardioversion. Pathological ECG recordings:<br>- rhythm and conduction disturbances: respiratory sinus arrhythmia, bradycardia, tachycardia, supraventricular arrythmias (supraventricular extrasystoles, atrial flutter, atrial fibrillation), ventricular arrhythmias (ventricular extrasystoles, ventricular tachycardia, ventricular flutter and ventricular fibrillation), atrioventricular blocks ($1^{st}$, $2^{nd}$ and $3^{rd}$ degree), asystole, preexcitation syndrome (Wolff-Parkinson-White) | B.W16, B.W20, B.W21, B.W23, B.W24, B.W25, B.U1, B.U7, B.U9, C.W27, C.W30, C.W32, C.U11 |

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| | - coronary heart disease: myocardial ischemia, myocardial infarction<br>- influence of electrolyte balance disturbances on the ECG recordings | |
| Seminar and classes | **Week 15: Physiology of cardiovascular system IV. Role of endothelium in vascular lumen regulation. Regulation of circulation in different organs. Microcirculation.**<br>Paracrine function of endothelium, endothelial factors. Nitric oxide - synthesis, regulation of release and mechanism of action. Influence of selected endothelial factors – prostaglandines, prostacycline, thromboxane, endothelin and adenosine on blood vessels. Blood flow distribution between different circulatory areas. Blood flow autoregulation in different organs. Cardiac muscle metabolism, energetic substrates of cardiac muscle. Factors conditioning energy expenditure of cardiac muscle. Coronary flow. Coronary circulation anatomy. Factors affecting coronary vascular resistance. Influence of cardiac cycle on coronary flow. Coronary reserve. Coronary vessels diameter regulation by local metabolites and autonomic nervous system. Cerebral flow. Autoregulation of cerebral flow. Influence of gravity upon cerebral circulation. Role of oxygen and carbon dioxide in the regulation of cerebral vessels diameter. Influence of intracranial pressure alterations on cerebral flow. Microcirculation characteristics. Characteristics of blood flow through capillaries. Processes of exchange through capillaries: diffusion, filtration, reabsorption. Mechanism of microcirculation regulation – flow autoregulation, functional and reactive hyperemia. Role of endothelium in regulation of microcirculation. Pathomechanism and causes of shock. Complications of shock. Hypovolemic, septic, anaphylactic and cardiogenic shock – main differences in pathomechanisms. Mechanism of edema generation: hydrostatic, oncotic, lymphatic | B.W16, B.W20, B.W21, B.W23, B.W24, B.W25, B.U1, B.U7, B.U9, C.W27, C.W29, C.W30, C.W32, C.W33, C.W34, C.U11, C.U20 |
| Seminar and classes | **Week 16: Pathophysiology of cardiovascular system.**<br>The most frequent acquired vascular heart diseases (aortic stenosis and regurgitation, mitral stenosis and regurgitation, tricuspid regurgitation) – epidemiology, hemodynamics, clinical signs. Atherosclerosis: lipoprotein metabolism and their biological diversity. Functional and morphological lesions of arteries. Atherosclerosis generation and progression – causes, mechanism, role of prostacyclin and thromboxane in atherogenesis. Coronary heart disease – definition, causes, epidemiology, clinical signs. Myocardial infarction. Hibernation, stunning and remodeling of cardiac muscle. Acute and chronic heart failure – systolic, diastolic, left ventricular and right ventricular. Hypertension – definition, causes (essential and secondary hypertension). Ischemic and hemorrhagic cerebral stroke (definition and causes). | B.W16, B.W20, B.W21, B.W23, B.W24, B.W25, B.U1, B.U7, B.U9, C.W27, C.W30, C.W32, C.W33, C.W34, C.W47, C.U11, C.U20 |
| Seminar and classes | **Week 17: Respiratory system – anatomical and biophysical basis of respiration.**<br>Anatomy of the respiratory system. Structure and function of bronchial tree. Respiratory tracts innervation. Structure and function of pulmonary alveolus. Pleural cavity, intrapleural pressure, dependence on respiratory cycle. Mechanics of respiratory cycle. Lungs volume and capacity. Residual volume. Lungs minute ventilation, residual volume ventilation, alveolar ventilation. Respiratory system resistances. Surface tension. Surfactant. Respiratory muscles work. Pulmonary leakage. Pulmonary circulation. Pulmonary vessels walls structure. | B.W16, B.W20, B.W21, B.W24, B.W25, B.U1 |

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| | Pressure and flow resistance in pulmonary circulation. Pulmonary vessels diameter regulation, influence of oxygen pressure on pulmonary vessels smooth muscles. Neuronal and humoral regulation of respiratory system activity. Regulation of respiration, generation of respiratory pattern. Regulation of respiratory center; central and peripheral receptors. Airways and lungs receptors and associated reflexes – cough, yawn, reaction to toxic substances inspiration). | |
| Seminar and classes | **Week 18: Respiratory system – clinical physiology and pathophysiology.**<br>Respiratory system basic diagnostic tests (spirometry). Difference between obturation and restriction. Spirometry testing (obturation reversibility, provocation tests). Plethysmography in restrictive diseases diagnostics. Mechanism of lungs artificial ventilation. Acute and chronic respiratory failure. Pathophysiology of respiratory system inflammatory diseases (laryngitis, bronchitis, pneumonia). Pathophysiology of obstructive and restrictive diseases (bronchial asthma, COPD, emphysema, pneumoconiosis). Cystis fibrosis. Pulmonary embolism. Pathological respiratory patterns. Obstructive sleep apnea. Nicotinismus. Mountain sickness. | B.W16, B.W20, B.W21, B.W24, B.W25, B.U1, B.U7, B.U9, C.W27, C.W30, C.W32, C.W33, C.W34, C.W47, C.U11, C.U20 |
| Seminar and classes | **Week 19: Summary of the 2nd Block** | B.W16, B.W20, B.W21, B.W23, B.W24, B.W25, B.U1, B.U7, B.U9, C.W6, C.W27, C.W29, C.W30, C.W32, C.W33, C.W34, C.W47, C.U11, C.U20 |
| Seminar and classes | **Week 20: 2nd Midterm** – themes from the 2nd Block. | B.W16, B.W20, B.W21, B.W23, B.W24, B.W25, B.U1, B.U7, B.U9, C.W6, C.W27, C.W29, C.W30, C.W32, C.W33, C.W34, C.W47, C.U11, C.U20 |
| Seminar and classes | **Week 21: Physiology and pathophysiology of urinary system.**<br>Kidney structure and vasculature. Nephron as a basic functional unit of kidney. Mechanism of primary urine formation (glomerular filtration: filtration membrane, effective filtration pressure). Creatinine clearance – methods of calculation, Cocroft-Gault formula, MDRD formula. Final urine formation (tubular transport). Tubuloglomerular feedback. Renal blood flow regulation and its autoregulation. Pressure diuresis. Other causes of diuresis change. Neurogenic regulation of renal flow and tubular transport (renal innervation, reflexive regulation). Hormonal and humoral regulation of renal flow and tubular transport (renin-angiotensin-aldosterone system, vasopressin, endothelins, nitric oxide, natriuretic peptides, dopamine, adrenomedullin, cytokines). Urine concentrating and diluting mechanisms (countercurrent multiplication, countercurrent exchange, urea recycling). Calcium and phosphate balance regulation by kidney. Hormonal functions of kindey - erithropoietin, vitamin D. Role of kidney in blood pressure regulation. Renal circulation – anatomical and functional peculiarities. Polyuria, oliguria, anuria. Diabetes insipidus (central and renal form). Acute kidney failure and chronic kidney disease, Proteinuria. Nephritic and nephotic syndrome. Nephrolithiasis. Influence of uremia on the whole organism. Cystitis and urinary tract infection. | B.W1, B.W2, B.W3, B.W21, B.W24, B.W25, B.U1, B.U7, C.W27, C.W32, C.W33, C.W34, C.W45, C.U11, C.U20 |

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| Seminar and classes | **Week 22: Physiology and patophysiology of water, electrolyte and acid-base balance**<br>Water and electrolyte balance. Body fluid compartments – volumes and composition. Body fluids ion composition and osmolarity. Transport of osmotically active substances across biological membranes – regulation. Mechanisms regulating water and electrolytes intracorporeal translocations. Mechanisms regulating cellular volumes. Water, sodium, potassium, calcium and phoshate balance. Mechanisms regulating water and sodium balance. Dehydration and overhydration – types, mechanisms and consequences. Electrolyte balance disturbances – hiper- and hyponatremia, hyper- and hypokaliemia, hyper- and hypocalcemia, hyper- and hypomagnesemia). Acid-base balance. Volatile and non-volatile acids. Inter- and intracellular buffering systems. Role of kidney and respiratory system in pH maintenance. Acid-base balance – methods of assessment. Cerebrospinal fluid pH regulation. Primary and secondary acid-base balance disturbances: acidosis (respiratory, metabolic – causes), alkalosis (respiratory, metabolic – causes). Compensatory mechanisms in primary acid-base balance disturbances (rules of respiratory and renal compensation). Influence of acid-base balance disturbances on electrolyte balance. | B.W1, B.W2, B.W3, B.W21, B.W24, B.W25, B.U1, B.U7, C.W27, C.W32, C.W33, C.W34, C.W45, C.U11, C.U20 |
| Seminar and classes | **Week 23: Physiology and pathophysiology of gastrointestinal system**<br>Neurohormonal regulation of food intake. Autonomic intestinal system. Gastrointestinal and biliary system motility. Secretory function of digestive glands – saliva excretion, gastric, pancreatic and intestinal secretion). Interaction between endocrine and exocrine pancreatic secretion. Structure and function of liver. Digestion and absorption (water, electrolytes, vitamins, minerals, carbohydrates, proteins, fats). Hepatic circulation – anatomic and functional peculiarities. Disturbances of gastrointestinal motility function (vomits, diarrhea, constipation, achalasia, GERD). Gastric and duodenal ulcer disease. Pathophysiology of liver, gall bladder and biliary ducts (jaundice, viral hepatic diseases, liver cirrhosis, cholecystitis, cholelithiasis). Pathophysiology of pancreas (acute and chronic pancreatitis). Autoimmune intestinal diseases – disturbances of digestion and absorption (inflammatory bowel diseases, pernicious anemia). Gastrointestinal neoplastic diseases. | B.W21, B.W24, B.W25, B.U7, C.W27, C.W32, C.W33, C.W34, C.W48, C.W49, C.W50, C.U11 |
| Seminar and classes | **Week 24: Endocrine system part I. Hypothalamic-pituitary-thyroid axis, Hypothalamic-pituitary-suprarenal axis – physiology and pathophysiology. Hypothalamic and pituitary hormones.**<br>Hypothalamic-pituitary-thyroid axis. TRH and TSH – activity and regulation of secretion. Thyroid hormones regulatory function. Interaction between thyroid and other hormones. Hypothalamic-pituitary-suprarenal axis. CRH and ACTH – activity and regulation of secretion. Mineralocorticoids and glucocorticoids – regulatory function. Hyperprolactinemia. Cushing's syndrome and Cushing's disease. Conn's syndrome. Hyperthyroidism and hypothyroidism. Suprarenal cortex and medulla disturbances. | B .W21, B.W24, B.W25, B.U7, C.W27, C.W32, C.W34, C.W51, C.U11 |
| Seminar and classes | **Week 25: Endocrine system part II. Pancreatic endocrine function. Endocrine regulation of growth and metabolism. Endocrine regulation of calcium balance – physiological and pathophysiological basis. Stress phenomenon.**<br>Endocrine regulation of growth and metabolism. Growth hormone – regulation of secretion and mechanism of action. Specificity and selectivity of individual growth factors activity in organs and tissues. | B.W16, B.W21, B.W24, B.W25, B.U7, C.W27, C.W32, C.W34, C.W51, C.U11 |

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| | Pancreas as endocrine organ (glucagon and insulin). Endocrine regulation of calcium balance. Parathormone (PTH), calcitonin, vitamin D3. Diabetes, gigantism, acromegaly. Disturbances of calcium balance (tetany, rickets, osteoporosis). Theories of stress. Adaptative function of stress. Stress hormones (hypothalamic-pituitary-suprarenal axis, ADH). Brain neurotransmission systems alterations and sympathetic system excitement during stress. Human organism's reaction to acute and chronic stress. Stress influence on cardiovascular and psychiatric disorders development. PTSD. | |
| Seminar and classes | **Week 26: Physiology and pathophysiology of reproductive system, pregnancy and bird. Lactation.**<br>Endocrine regulation of reproductive function. Sex hormones in men and women – mechanism of action and regulation of secretion. Menstrual cycle (hormone levels alterations, endometrial alterations, vaginal mucosal alterations). Maturation and puberty. Menopause. Andropause. Fertilization and zygote implantation. Uterine-fetal unit (exchange between mother and fetus, hormones of uterine-fetal unit). Development of the fetus. Alterations in pregnant woman's organism (hormonal, metabolic, cardiovascular, respiratory, genitourinary, gastrointestinal and nervous system). Birth. Lactation. Female and male infertility. Miscarriage risk factors. Gestational diabetes and hypertension. Gestosis. HELLP syndrome. Post-term pregnancy. Ectopic pregnancy. Trophoblast – neoplastic changes (invasive mole). Selected fetal abnormalities – congenital heart diseases (persistent aortic duct, atrial septal defect, ventricular septal defect, aortic coarctation, tetralogy of Fallot), Down's syndrome, Turner's syndrome, Fetal Alcoholic Syndrome (FAS), Intrauterine Growth Restriction (IUGR). Prematurity – causes and long-term consequences. | B.W21, B.W22, B.W23, B.W24, B.W25, B.U7, C.W33, C.W51, C.U11 |
| Seminar and classes | **Week 27: Resting and exercise energy expenditure. Thermoregulation. Obesity. Metabolic disturbances.**<br>Central regulation of hunger and satiety. Fat tissue as a source and target of hormones. Real and ideal body weight. Basic and rest metabolism. Energetic balance of the organism. Rules of proper nutrition. Human organism energetic expenditure – methods of measurement (direct and indirect calorimetry). Metabolic disorders. Obesity and undernourishment. Heat production and exchange with environment. Heat balance. Internal and skin temperature. Internal temperature alterations – tolerance limits. Thermoregulation system – mechanism of action central and peripheral thermoreceptors, cerebral thermoregulation center. Role of cutaneous circulation in thermoregulation. Regulation of perspiration. Human organism reaction to heat and cold. Acclimatization to cold and hot temperatures. Hypothermia. Hyperthermia (heat shock – mechanism, diagnosis). Malignant hyperthermia. Fever. | B.W20, B.W21, B.W24, B.W25, B.U9, C.W33, C.W34, C.W50, C.W51, C.U11, C.U20.W20, B.W21, B.W24, B.W25, B.U9, C.W33, C.W34, C.W50, C.W51, C.U11, C.U20 |
| Seminar and classes | **Week 28: Physiology of physical exercise.**<br>Sources of energy for skeletal muscles. Use of energy sources according to type, duration and intensity of physical exercise. Oxygen absorption at rest and during exercise. Oxygen debt and oxygen deficit. Functional equilibrium during physical activity. Respiratory quotient. Effective work quotient. Physical performance – methods of measurement and their physiological basis. Classification of physical | B.W1, B.W2, B.W16, B.W20, B.W21, B.W23, B.W24, B.W25, B.U7, B.U9, C.W27, C.W30, C.W33, C.U11, C.U20 |

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| | exercises. Factors determining amount of oxygen supply to tissues by cardiovascular system (Fick's law). Cardiovascular system reaction to dynamic exercises – alterations of stroke volume, heart rate, cardiac output, blood pressure (systolic, diastolic and mean) and venous return under dynamic submaximal physical exercise of constant or increasing intensity. The state of functional equilibrium. Influence of body position on stroke volume during dynamic exercises. Blood flow regulation in different vascular areas during dynamic physical exercises. Cardiovascular system reaction to local static exercises – alterations of heart rate, blood pressure, conditions of blood flow through working muscle. Contraindications to local and global static exercises. Influence of age, sex and physical performance on the adaptation of cardiovascular system to physical exercise. ECG on exertion. Diagnostic value of ECG on exertion in the diagnosis of chronic coronary syndrome, hypertension and arrhythmias. ECG on exertion – indications and contraindications. Physical tolerance in patients after heart transplantation (HTX). Beneficial effects of physical training in different pathological conditions – cardiovascular system diseases, diabetes, COPD, bronchial asthma). Negative consequences of overtraining (Overtraining syndrome). | |
| Seminar and classes | **Week 29: Summary of the 3rd Block** | B.W1, B.W2, B.W3, B.W16, B.W20, B.W21, B.W22, B.W23, B.W24, B.W25, B.U1, B.U7, B.U9, CW.27, C.W30, C.W32, C.W33, C.W34, C.W45, C.W48, C.W49, C.W50, C.W51, C.U11, C.U20 |
| Seminar and classes | **Week 30: 3rd Midterm** – themes from the 3st Block. | B.W1, B.W2, B.W3, B.W16, B.W20, B.W21, B.W22, B.W23, B.W24, B.W25, B.U1, B.U7, B.U9, C.W27, C.W30, C.W32, C.W33, C.W34, C.W45, C.W48, C.W49, C.W50, C.W51, C.U11, C.U20 |
| Lecture | **Inauguration lecture** | |
| Lecture | **Brain neuroplasticity. Developmental disorders of plasticity.** | B.W20, B.W21, B.W25, C.W27, C.W32, C.W34 |
| Lecture | **Neurodegenerative diseases.** | B.W20, B.W21, B.W25, C.W27, C.W32, C.W34 |
| Lecture | **Behaviour. Limbic system. Prefrontal cortex. Neurobiology of speech.** | B.W20, B.W21, B.W25, C.W27, C.W32, C.W34 |
| Lecture | **Consciousness and awareness. Disturbances of consciousness.** | B.W20, B.W21, B.W25, C.W27, C.W32, C.W34 |
| Lecture | **Neurodegeneration in ophthalmic diseases. Clinical aspects.** | B.W.7, B.W.24, C.W.22, C.W.33, C.W.34 |
| Lecture | **Hemostasis. Hemostatic disorders** | B.W21, B.W25, C.W27, C.W33, C.W34 |

| | | |
|---|---|---|
| Lecture | **Hematologic disorders** | B.W25, C.W6, C.W34 |
| Lecture | **Pathophysiology of the most common heart diseases** | B.W21, B.W25, C.W29, C.W30, C.W32, C.W33, C.W34 |
| Lecture | **Short- and long-term regulation of blood pressure. Arterial hypertension.** | B.W1, B.W20, B.W21, B.W24, B.W25, C.W30, C.W32, C.W33, C.W34 |
| Lecture | **Electrocardiography** | B.W20, B.W25, C.W32, C.W45 |
| Lecture | **The conducting system of the heart. Mechanisms of cardiac arrhythmia. The examples of the most common arrhythmia.** | B.W1, B.W20, B.W21, B.W24, B.W25, C.W30, C.W32, C.W33, C.W34 |
| Lecture | **Coronary artery disease. Myocardial infarction.** | B.W21, B.W24, B.W25, C.W30, C.W32, C.W33, C.W34 |
| Lecture | **Pathophysiology of acute and chronic heart failure.** | B.W21, B.W24, B.W25, C.W30, C.W32, C.W33, C.W34 |
| Lecture | **Pulmonary circulation. Deep vein thrombosis and pulmonary embolism. Pulmonary hypertension.** | B.W21, B.W25, C.W27, C.W33, C.W34 |
| Lecture | **The pathophysiology of the most common respiratory system diseases. Basic diagnostic tests of the respiratory system. Mechanical ventilation.** | B.W21, B.W24, B.W25, C.W30, C.W32, C.W33, C.W34 |
| Lecture | **Pathophysiology of urinary tract diseases. Basic diagnostic tests.** | B.W1, B.W2, B.W21, B.W24, B.W25, C.W30, C.W32, C.W33, C.W34 |
| Lecture | **Pathophysiology of the most common diseases of the digestive system.** | B.W21, B.W24, B.W25, C.W30, C.W32, C.W33, C.W34, C.W49 |
| Lecture | **Hormonal regulation of metabolism. Regulation of calcium homeostasis. Hormonal regulation of growth. Pathophysiology of endocrine system.** | B.W16, B.W21, B.W24, B.W25, C.W30, C.W32, C.W33, C.W34, C.W51 |
| Lecture | **Physiology and pathophysiology of pregnancy.** | B.W21, B.W22, B.W24, B.W25, C.W30, C.W32, C.W33, C.W34, C.W51 |
| Lecture | **Mechanisms of human adaptation to extreme conditions.** | B.W1, B.W2, B.W21, B.W25, C.U20 |
| Lecture | **Physiology of ageing. Civilization diseases.** | B.W23, B.W24, C.W47 |

## 7. LITERATURE

**Obligatory**

John E. Hall. Guyton and Hall Textbook of Medical Physiology, 13th Edition , 2016, Elsevier

| |
|---|
| Gary D. Hammer, MD, PhD, Stephen J. McPhee, MD, Pathophysiology of Disease: An Introduction to Clinical Medicine, 2014, 7e, McGraw Hill. |
| **Supplementary** |
| Rodney A. Rhoades, David R. Bell : Medical physiology : principles for clinical medicine — 2013, 4th ed. Wolter's Kluwer |

## 8. VERIFYING THE EFFECT OF LEARNING

| Code of the course effect of learning | Ways of verifying the effect of learning | Completion criterion |
|---|---|---|
| B.W1,2,3,7,16,20,21-25<br>B.U1,7,9<br>C.W6,20,27,29,30,32-34,45,47-51<br>C.U11,20 | Seminars and classes – Students need to actively participate in the seminars classes, which is assessed by the assistant who perform the seminar or class. **In every week,** after completion of the seminars the MCQ (5 questions) on e-learning platform needs to be completed. The MCQ session will be opened from Monday (08:00 p.m.) to Thursday (until 23:59). There will be 1 trial for the MCQ.<br>**Student must take all the MCQ, if a MCQ is not taken the vote from this MCQ is 0 point.**<br>**The average vote is calculated before every Midterm MCQ, from the MCQs in all didactic weeks preparing for the certain MCQ** (i.e. e.g. average vote to the 2nd Midterm MCQ is calculated from the MCQs only from weeks 11th-18th). | MCQ after the seminars – student needs to obtain average vote 3/5 to be qualified for the Midterm MCQ. If average vote is lower than 3/5 the oral examination before qualification to the Midterm MCQ is needed. |
| B.U1,7,9<br>B.W1-3, 7,16,2-25,33<br>C.U11,20<br>C.W22,27,29,30,322-34,45,47-51 | 3 Midterm MCQs after completion of the block – test with 30 MCQ.<br>Retake if the Midterm MCQ is failed – test with 10 MCQ<br>If the retake is failed – 2nd retake - oral examination directly by the assistant responsible for the didactic. | 18/30 (60%) points to pass<br>Retake – 6/10 points to pass<br>2nd retake – completion confirmed by the lecturer |
| B.U1,7,9<br>B.W1-3, 7,16,2-25,33<br>C.U11,20<br>C.W22,27,29,30,322-34,45,47-51 | Final exam – test with 100 MCQ<br>Includes topics from lectures, seminars and classes. | 60% of points to pass |

## 9. ADDITIONAL INFORMATION *(information essential for the course instructor that are not included in the other part of the course syllabus e.g. if the course is related to scientific research, detailed description of, information about the Science Club)*

**Lectures: room 8 CBI/ e-learning – information will be given on e-learning platform**

**Seminars:**

- **Monday Group 3 - 15.00-16.45 Classroom 6 low basement, Pawińskiego 3C**
- **Monday Group 4 - 17.00-18.45 – Classroom 6 low basement, Pawińskiego 3C**
- **Wednesday Group 1, 2 together (until 30.11.2021) - 17.00-18.40 Classroom 7 low basement, Pawińskiego 3C**
- **Wednesday Group 1 (from 01.12.2021) - 15:00-16:40 Classroom 7 low basement, Pawińskiego 3C**
- **Wednesday Group 2 (from 01.12.2021) - 17.00-18.40 Classroom 7 low basement, Pawińskiego 3C**

**Practical classes**

- **Group 1 Friday 16:45-19:15 dept. Classroom, Pawińskiego 3C**
- **Group 2 Friday 14:15-16.45 dept. Classroom, Pawińskiego 3C**
- **Group 3 Friday 11:30-14:00 dept. Classroom, Pawińskiego 3C**
- **Group 4 Friday 09:00-11:30 dept. Classroom, Pawińskiego 3C**

**The presence on the seminars and classes is compulsatory. 2 absences on the Seminar and 2 absences on the Classes are permissible. However, the absence on seminar or classes doesn't release form the obligation to take the MCQ in every week with seminars and classes.**

- **In every week, after completion of the seminars the MCQ (5 questions) on e-learning platform needs to be completed. The MCQ session will be opened from Monday (08:00 p.m.) to Thursday (until 23:59). There will be 1 trial for the MCQ. Student must take all the MCQ, if a MCQ is not taken the vote from this MCQ is 0 point. The average vote is calculated before every Midterm MCQ, from the MCQs in all didactic weeks preparing for the certain MCQ (i.e. e.g. average vote to the 2nd Midterm MCQ is calculated from the MCQs only from weeks 11th-18th).**
- **Importantly – the required knowledge to pass the MCQ covers the entire material arranged for the certain week (not only material from the seminars).**
- **If average vote from the MCQs before the certain Midterm MCQ is lower than 3/5 the oral examination before qualification to the Midterm MCQ is needed.**
- **If the MCQ doesn't be prepared on e-learning platform the Students will be informed and the MCQ will be organized on Classes (on Friday).**

**In order to be qualified for the Midterm – all MCQs need to be passed.**
**Final exam – 100 MCQs**

- **60% of points needs to be gained in order to pass the exam and obtain grade 3 (satisfactory). The scoring for the higher grades will be created after the exam, according to the Gaussian curve.**
- **In case of the failure in the Final Exam – the organization, form and complete criterion for the retake will be issued by the Chair and Department of Experimental and Clinical Physiology.**

**Scientific Club – information on the Department website.**

# Research Methodology

| 1. IMPRINT | |
|---|---|
| **Academic Year** | 2021/2022 |
| **Department** | Faculty of Medicine |
| **Field of study** | Medicine |
| **Main scientific discipline** *(in accord with appendix to the Regulation of Minister of Science and Higher education from 26th of July 2019)* | **Medical science** |
| **Study Profile** *(general academic / practical)* | General academic |
| **Level of studies** *(1st level /2nd level/ uniform MSc)* | Uniform MSc |
| **Form of studies** | **Full-time and extramural** |
| **Type of module / course** *(obligatory / non-compulsory)* | **Obligatory** |
| **Form of verification of learning outcomes** *(exam / completion)* | **Completion** |
| **Educational Unit / Educational Units** *(and address / addresses of unit / units)* | **Department of Methodology (1MN)**<br>Center for Preclinical Research, 1b Banacha Street, 3rd floor, room B06<br>e-mail: metodologia@wum.edu.pl, www.metodologia.wum.edu.pl<br>**Department of Regenerative Medicine**<br>Ul. Banacha 1b, 2 piętro, pokój P15, tel. 22 116 61 05/09, e-mail: medycyna.regeneracyjna@wum.edu.pl |

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|---|---|
| | **Department of Health Economics and Medical Law**<br>Żwirki Wigury 81 Street, ZIAM building room no 5, tel. : 22 57-20-702 , e-mail: zep@wum.edu.pl www. zep.wum.edu.pl/ |
| **Head of Educational Unit / Heads of Educational Units** | **Prof. Paweł Włodarski MD,PhD** |
| **Course coordinator** *(title, First Name, Last Name, contact)* | **Wiktor Paskal, MD, PhD, metodologia@wum.edu.pl** |
| **Person responsible for syllabus** *(First name, Last Name and contact for the person to whom any objections concerning syllabus should be reported)* | **Wiktor Paskal, MD, PhD, metodologia@wum.edu.pl** |
| **Teachers** | **Department of Methodology of Scientific Research**<br>Prof. Paweł Włodarski MD, PhD<br>Wiktor Paskal, MD, PhD<br>Kacper Pełka MD,<br>Dawid Mehlich MD,<br>Klaudia Klicka MD,<br>Albert Stachura MD,<br>Tomasz Grzywa MD,<br>**Department of Regenerative Medicine**<br>Kamila Bujko, MSc<br>Vira Chumak, DSc<br>Andrzej Ciechanowicz, DSc, PhD<br>Mateusz Adamiak, DSc, PhD<br>**Department of Health Economics and Medical Law**<br>Prof. Aleksandra Czerw, PhD |

## 2. BASIC INFORMATION

| | | | |
|---|---|---|---|
| **Year and semester of studies** | II year, III and IV semester | **Number of ECTS credits** | 1 |

| FORMS OF CLASSES<br>**Contacting hours with academic teacher** | **Number of hours** | **ECTS credits calculation** |
|---|---|---|
| Lecture (L) | 5 (2,5 in e-learning) | 0.1 |
| Seminar (S) | 15 (15 in e-learning) | 0.3 |
| Classes (C) | 15 | 0.5 |
| e-learning (e-L) | | |
| Practical classes (PC) | | |

| | | |
|---|---|---|
| Work placement (WP) | | |
| **Unassisted student's work** | | |
| Preparation for classes and completions | 10 | 0,1 |

| **3.** | **COURSE OBJECTIVES** |
|---|---|
| O1 | To acquire the knowledge and skills necessary to conduct scientific research in accordance with Good Laboratory Practice (GLP) and Good Clinical Practice (GCP) standards. |
| O2 | To systematize evidence-based knowledge (Evidence Based Medicine, EBM) necessary in daily medical practice. |
| O3 | Introduction to sources of scientific data, ways of obtaining them and critical analysis. The phenomenon of pseudoscience. |
| O4 | Gain the ability to plan and execute a simple scientific project and prepare the results for publication in scientific journals and presentation at conferences. |
| O5 | Formation of correct ethical attitudes in scientific research. |

**4.** **STANDARDS OF LEARNING – DETAILED DESCRIPTION OF EFFECTS OF LEARNING** *(concerns fields of study regulated by the Regulation of Minister of Science and Higher Education from 26 of July 2019; does not apply to other fields of study)*

| **Code and number of effect of learning in accordance with standards of learning** *(in accordance with appendix to the Regulation of Minister of Science and Higher education from 26th of July 2019)* | **Effects in time** |
|---|---|
| **Knowledge – Graduate* knows and understands:** | |
| G.W8 | knows the regulations on medical experimentation and other medical research |
| BW29 | knows the principles of scientific, observational and experimental research and in vitro studies for the development of medicine |
| **Skills– Graduate* is able to:** | |
| B.U11 | choose an appropriate statistical test, perform basic statistical analyses and use appropriate methods to present results; interpret results of meta-analysis and perform survival probability analysis |
| B.U12 | explains the differences between prospective and retrospective, randomised and case-control studies, case reports and experimental studies and ranks them according to the reliability and quality of scientific evidence |
| B.U13 | plans and carries out a simple scientific investigation and interprets its results and draws conclusions |
| C.U11 | recognizes own limitations, makes self-assessment of deficits and educational needs, plans own educational activity |

| | |
|---|---|
| D.U16 | demonstrate responsibility for improving their own skills and passing on knowledge to others |
| D.U17 | critically analyses medical literature, including English, and draws conclusions based on the available literature |

** In appendix to the Regulation of Minister of Science and Higher education from 26th of July 2019 „graduate", not student is mentioned.*

**5. ADDITIONAL EFFECTS OF LEARNING** *(non-compulsory)*

| Number of effect of learning | Effects of learning in time |
|---|---|

**6. CLASSES**

| Form of class | Class contents | Effects of Learning |
|---|---|---|
| **Lectures** | **L1 - Creative scientific and research activities - conditions, requirements and legal protection.**<br>Conducting legal research in medicine and the biological sciences. Legally permissible animal, clinical, biomedical research. Protection of patients' personal data. Limits and legal conditions of creativity in medical and biological sciences. Copyright and industrial property rights.<br>Lecture in the form of synchronous e-learning | G.W8, D.U16 |
| | **L2 - Science, not fiction. Means several words about manipulations in science.**<br>Unreliability and falsification in science. Manipulations in research design and interpretation. Problems of "predatory journals". Using scientific research in marketing and advertisement. Issues of pseudoscience.<br>Lecture in the form of asynchronous e-learning | G.W8, B.W29, D.U16 |
| **Seminars** | **S1 - Ethics in scientific research.**<br>Knowledge of regulations regarding the ethics of conducting animal and human research. Protection of sensitive data. The guidelines of the Declaration of Helsinki for the conduct of human research. Informed consent for research. Preparing an application to the bioethics committee. Animal research - EU and IACUC guidelines, principles of animal research design, legislation and preparation of applications to the Animal Ethics Committee.<br>Seminar in the form of asynchronous e-learning | G.W8, C.U11, D.U16 |
| | **S2 - Fundamentals of EBM.**<br>Learning the principles of EBM, clinical research design. Types of scientific research. Research design - formulating a research question.<br>Seminar in the form of asynchronous e-learning. | B.W29, B.U11, B.U12, D.U16 |
| | **S3 - Data types, basic statistics for research**<br>Identify the type of data obtained from research studies. Use and significance of PPV, NPV, OR, HR, CI95%. Determination of the minimum group size in the planned study.<br>Seminar in the form of asynchronous e-learning. | B.U11, B.U12, B.U13, D.U16 |
| | **S4 - Medical databases.**<br>Effective use of medical databases to answer a scientific or clinical question. Basics of use and features of selected services for scientists and physicians.<br>Seminar in the form of asynchronous e-learning | D.U17, C.U11 |
| | **S5 -Clinical trials** | B.W29, B.U13, D.U17, D.U16, C.U11 |

| | | |
|---|---|---|
| | Design, organization, methodology, phases of clinical trials. Interpretation of results including the most frequent errors. Use of research results in practice and medical technology assessment. Seminar in the form of asynchronous e-learning | |
| | **S6 - Methodology of preclinical research.** Planning of pre-clinical research. Use of basic research results in clinical trials. Relevance and limitations of experimental studies. Seminar in the form of asynchronous e-learning | B.W29, B.U13, D.U16 |
| | **S7 - Critical analysis of publications.** Analysis of scientific articles using CONSORT and PRISMA guidelines. Systematic reviews and meta-analyses. Statistical versus clinical significance. Interpretation of survival using the Kaplan-Meier method Seminar in the form of asynchronous e-learning | G.W8, B.W29, B.U11, B.U12, B.U13, D.U17, D.U16, C.U11 |
| | **S8 - Principles of preparing an abstract of a scientific article and a conference report.** Rules for preparing clear and correct abstracts. Discussion of the most common mistakes made in scientific reports. Seminar in the form of asynchronous e-learning | G.W8, B.W29, B.U12, B.U13, D.U17, D.U16, C.U11 |
| **Classes** | **C1 - Data types, basic statistics for research** Exercise complementary to the topic S3. Exercise in the form of asynchronous e-learning | B.U11, B.U12, B.U13, D.U16 |
| | **C2 - Statistical analysis of scientific data.** Statistical analysis of research data, interpretation of results, selection of optimal significance tests. Descriptive statistics, analysis of differences between groups. Practical use and interpretation of test results: Student's T-test, Mann-U-Whitney, Chi-square. Exercise in stationary form. | B.U11, B.U12, B.U13 |
| | **C3-C5 Exercises complementary to the topics of seminars S6-S8.** Exercise in the form of synchronous e-learning. | G.W8, B.W29, B.U11, B.U12, B.U13, D.U17, D.U16, C.U11 |
| | **C6 - Forms of scientific data presentation.** Principles of graphic presentation of results. Creating clear charts, tables and diagrams. Tools helpful in preparing presentations. Practicing presentation of results. Exercise in the form of synchronous and asynchronous e-learning. | B.U13, D.U17, D.U16, C.U11 |

## 7. LITERATURE

**Obligatory**

Materials on the e-learning platform prepared by the Department of Methodology

**Supplementary**

- Podstawy EBM czyli Medycyny opartej na danych naukowych dla lekarzy i studentów medycyny. Pod red. Piotra Gajewskiego, Romana Jaeschke, Jana Brożka. Wyd. Medycyna praktyczna, Kraków 2008, wyd. 1.
- Medical databases and professional medical journals – Pubmed, Embase, Scopus, Cochrane, Web of Science.
- Kodeks Etyki Lekarskiej, tekst jednolity z dnia 2 stycznia 2004r., zawierający zmiany uchwalone w dniu 20 września przez Nadzwyczajny VII Krajowy Zjazd Lekarzy, Warszawa 2004
- https://poradnik-naukowy.gumed.edu.pl/

## 8. VERIFYING THE EFFECT OF LEARNING

| Code of the course effect of learning | Ways of verifying the effect of learning | Completion criterion |
|---|---|---|
| *e.g. G.K1, G.S1, K1* | *This field defines the methods used for grading students e.g. pop quiz, test, written report etc.* | *e.g. threshold number of points* |
| G.W8, B.W29 | Credit of e-course (S, C): test questions and practical tasks in the form of e-learning<br>Passing the final test from the materials on the e-learning platform | Credit for classes in the form of e-learning. |
| B.U11, B.U12, B.U13, C.U11, D.U16, D.U17 | Exercises and seminars (C, S) with an assistant: attendance, activity, realization of the topic, answering to the questions of the teacher and preparing a presentation on the last class. | Positive evaluation by the teacher. |

## 9. ADDITIONAL INFORMATION *(information essential for the course instructor that are not included in the other part of the course syllabus e.g. if the course is related to scientific research, detailed description of, information about the Science Club)*

**General comments.**

The series of classes conducted by different Departments, led by the Department of Research Methodology, lasts for 7 weeks.

On the website of the Department of Research Methodology (http://metodologia.wum.edu.pl/) and on the e-learning platform there will be available schedules with information on how the classes will be conducted and the dates of classes for particular groups.

Full-time and e-learning synchronous classes (7 weekly meetings) will be held according to the schedule set for the following Dean's groups.

Seminars as well as Asynchronous Exercises and Lectures (C1, C5, W2) will be available on the e-learning platform (https://e-learning.wum.edu.pl/login/index.php) throughout the academic year.

The synchronous lecture (W1) takes place in the summer semester. The date will be communicated to the students at the beginning of the summer semester.

**ATTENTION - the condition to take the last class in the schedule for a given group is a positive result of the final test on the e-learning platform. To take the test you need to read all obligatory materials on the platform and pass all sub-tests (otherwise the test will not be available).**

We recommend that you familiarize yourself with the subsequent modules of the course on an ongoing basis. Many seminars (S3, S6-8, C6) constitute direct preparation for the exercise classes of the given topic (C2-C6) and the familiarisation with the material may be verified by the tutors during the classes.

Regulations and organization of classes:

1. Attendance at classes and seminars is compulsory.
2. Any absence from classes must be made up. Making up the classes at another time is possible only after an agreement with the Department, subject to availability. Inquiries about making up classes (e-learning and classes with an assistant) should be sent to: metodologia@wum.edu.pl
3. Part of the seminars is conducted in the form of e-learning. A student is obliged to do subsequent modules according to the schedule available on the e-learning platform.
4. Students are obliged to come to classes prepared to the content. Not being ready for classes is treated as an absence (especially during exercises C2-C6).
5. The condition to get the pass mark for the course is the participation in all classes and seminars and getting the positive mark of the assistant for the knowledge of the material provided for the given exercise and making and presenting the presentation during the last class.

The person responsible for didactics - Wiktor Paskal, MD, PhD. Contact via e-mail: metodologia@wum.edu.pl

Obtaining credit in the index is possible after completing all seminars, exercises and lecture in the summer semester.

There is a Student Scientific Society at the Department. Persons interested in cooperation are welcome to contact; SKN Supervisor - Wiktor Paskal, MD, PhD; e-mail: metodologia@wum.edu.pl.
The profile of the Department's scientific activity - https://metodologia.wum.edu.pl/node/81

# Biochemistry with elements of chemistry

| 1. IMPRINT | |
|---|---|
| **Academic Year** | 2021/2022 |
| **Department** | Faculty of Medicine |
| **Field of study** | Medicine |
| **Main scientific discipline** *(in accord with appendix to the Regulation of Minister of Science and Higher education from 26th of July 2019)* | **Medical science** |
| **Study Profile** *(general academic / practical)* | General academic |
| **Level of studies** *(1st level /2nd level/ uniform MSc)* | Uniform MSc |
| **Form of studies** | **Full time studies** |
| **Type of module / course** *(obligatory / non-compulsory)* | **Obligatory** |
| **Form of verification of learning outcomes** *(exam / completion)* | **Exam** |
| **Educational Unit / Educational Units** *(and address / addresses of unit / units)* | Chair and Department of Biochemistry,<br>First Faculty of Medicine<br>02-097 Warsaw, ul. Banacha 1<br>Phone: +48 (22) 57 20 693<br>e-mail: biochemia@wum.edu.pl<br>https://biochemia.wum.edu.pl |

| | |
|---|---|
| **Head of Educational Unit / Heads of Educational Units** | Prof. Marta Struga |
| **Course coordinator** *(title, First Name, Last Name, contact)* | Ewa Usarek, PhD<br>eusarek@wum.edu.pl |
| **Person responsible for syllabus** *(First name, Last Name and contact for the person to whom any objections concerning syllabus should be reported)* | Ewa Usarek, PhD<br>eusarek@wum.edu.pl |
| **Teachers** | Alicja Chrzanowska PhD, Wojciech Graboń PhD, Emilia Grosicka-Maciąg, PhD, Dagmara Kurpios-Piec PhD, Sylwia Michorowska PhD, Magdalena Mielczarek-Puta PhD, Dagmara Otto-Ślusarczyk PhD, Michał Skrzycki PhD, Jolanta Szymańska-Majchrzak PhD, Ewa Usarek PhD, Barbara Żyżyńska-Granica PhD |

## 2. BASIC INFORMATION

| | | | |
|---|---|---|---|
| **Year and semester of studies** | II year, 3 & 4 semester | **Number of ECTS credits** | 17.00 |

| FORMS OF CLASSES<br>**Contacting hours with academic teacher** | **Number of hours** | **ECTS credits calculation** |
|---|---|---|
| Lecture (L) | 40 | 2.0 |
| Seminar (S) | 50 | 4.0 |
| Classes (C) | 90 | 4.0 |
| e-learning (e-L) | | |
| Practical classes (PC) | | |
| Work placement (WP) | | |
| **Unassisted student's work** | | |
| Preparation for classes and completions | 190 | 7.0 |

## 3. COURSE OBJECTIVES

| | |
|---|---|
| O1 | To develop a solid understanding of the structures, properties, and metabolism of substances present in the body: proteins, carbohydrates, lipids, nucleic acids, vitamins, hormones; control and integration of metabolic pathways |
| O2 | To give insight into understanding how metabolic processes can contribute to an explanation of pathological phenomena. |

| | |
|---|---|
| O3 | To give the students experience in biochemical methodology to appreciate the clinical biochemistry techniques as diagnostic tools and to be able to interpret the results for appropriate diagnosis and follow up of patients. |

**4.** **STANDARDS OF LEARNING – DETAILED DESCRIPTION OF EFFECTS OF LEARNING** *(concerns fields of study regulated by the Regulation of Minister of Science and Higher Education from 26 of July 2019; does not apply to other fields of study)*

| **Code and number of effect of learning in accordance with standards of learning** *(in accordance with appendix to the Regulation of Minister of Science and Higher education from 26th of July 2019)* | **Effects in time** |
|---|---|
| **Knowledge – Graduate* knows and understands:** | |
| G.K1 | B.W1. Water and electrolyte balance in biological systems |
| G.K2 | B.W2. Acid-base balance and the mechanism of buffer action and their importance in organism homeostasis |
| G.K3 | B.W4. Basic reactions of organic and inorganic compounds in water solutions |
| G.K4 | B.W10. Structure of organic and inorganic compounds present in cells, extracellular matrix and body fluids |
| G.K5 | B.W11. Structure of lipids and polysaccharides and their roles in cellular and extracellular structures |
| G.K6 | B.W12. Primary, secondary, tertiary and quaternary structures of proteins, as well as the posttranslational and functional modifications of proteins and their importance |
| G.K7 | B.W13. Functions of nucleotides in the cell, the primary and secondary structure of DNA and RNA and the structure of chromatin |
| G.K8 | B.W14. Functions of the genome, transcriptome and human proteome and the basic methods used in their study; processes of replication, repair and recombination of DNA, transcription and translation and degradation of DNA, RNA and proteins; knows the concepts of the gene expression regulation |
| G.K9 | B.W15. Basic catabolic and anabolic pathways, how they are regulated by genetic and environmental factors |
| G.K10 | B.W16. Metabolic profiles of the main organs and systems |
| G.K11 | B.W17. Ways of communication between cells, as well as between the cell and the extracellular matrix and the pathways of transmitting signals in the cell and examples of disruption of these processes leading to cancer and other diseases |
| G.K12 | B.W25. Relationship between disturbing the balance between biological factors and physiological and pathophysiological changes |
| **Skills– Graduate* is able to:** | |
| G.S1 | B.U3. Calculate the molar and percent concentrations of compounds and the concentrations of substances in single and multi-component isotonic solutions |

| | |
|---|---|
| G.S2 | B.U4. Calculate the solubility of inorganic compounds, determine the chemical background of solubility of organic compounds or the lack of solubility and understand its practical meaning to dietetics and therapy |
| G.S3 | B.U5. Determine the pH of a solution and the influence of pH variations on organic and inorganic compounds |
| G.S4 | B.U6. Predict the direction of metabolic processes in terms of the energy state of cells |
| G.S5 | B.U8. Use the basic laboratory techniques, such as qualitative analysis, titration, colorimetric analysis, pH-metry, chromatography, electrophoresis of proteins and nucleic acids |
| G.S6 | B.U9. Use the basic measurement equipment and assess the precision of the measurements |
| G.S7 | B.U13. Plan simple research and interpret the results and draw conclusions |

** In appendix to the Regulation of Minister of Science and Higher education from 26th of July 2019 „graduate", not student is mentioned.*

**5. ADDITIONAL EFFECTS OF LEARNING** *(non-compulsory)*

| **Number of effect of learning** | **Effects of learning i time** |
|---|---|
| **Knowledge – Graduate knows and understands:** | |
| K1 | |
| K2 | |
| **Skills– Graduate is able to:** | |
| S1 | |
| S2 | |
| **Social Competencies – Graduate is ready for:** | |
| SC1 | |
| SC2 | |

**6. CLASSES**

| **Form of class** | **Class contents** | **Effects of Learning** |
|---|---|---|
| Lectures | 1. Water and electrolyte balance in biological system: solutions, acids and bases, concept of pH, hydrolysis, volumetric analysis | G.K1; G.K2 |
| | 2. Basic reactions of inorganic compounds in water solutions. Mechanism of buffer action and their importance in organism homeostasis | G.K2; G.K3 |
| | 3. Characterization of main groups of organic compounds (hydrocarbons, arenes, alcohols, ethers, carbonyl compounds, carboxylic acids and their derivatives, amines). Isomerism | G.K3; G.K4 |
| | 4. Proteins | G.K6 |

| | | |
|---|---|---|
| | 5. Enzymes | G.K9; G.K12; G.S3 |
| | 6. Nucleic acids, expression of genetic information | G.K7; G.K8 |
| | 7. Revisions | |
| | 8. Tissue oxidation | G.K9 |
| | 9, 10. Carbohydrates metabolism | G.K5; G.K9; G.K10; G.K12 |
| | 11, 12. Lipids metabolism, lipidoses, atherosclerosis | G.K5; G.K9; G.K10; G.K12 |
| | 13. Revisions | |
| | 14. Protein turnover, ureogenesis | G.K9; G.K10; G.K12 |
| | 15. Amino acids metabolism | G.K9; G.K10; G.K12 |
| | 16. Blood | G.K10; G.K12 |
| | 17. Metabolism of purine and pyrimidine nucleotides | G.K9; G.K12 |
| | 18. Vitamins and hormones | G.K9; G.K10; G.K11; G.K12 |
| | 19.Metabolism in the liver | G.K9; G.K10; G.K12 |
| | 20.Revisions | |
| Seminars | 1. Chemical calculations (concentrations) | G.K1; G.K2; G.S1 |
| | 2. Biochemical calculations (buffers) | G.K1; G.K2; G.S2; G.S3 |
| | 3. Analysis of organic compounds and inorganic ions | G.K3 |
| | 4. Proteins | G.K6 |
| | 5. Enzymes | G.K9; G.K12; G.S4 |
| | 6. Nucleic acids | G.K7; G.K8 |
| | 7. Tissue oxidation | G.K9 |
| | 8, 9. Metabolism of carbohydrates | G.K5; G.K9; G.K10; G.K12; G.S4 |
| | 10, 11. Metabolism of lipids | G.K5; G.K9; G.K10; G.K12; G.S4 |
| | 12. Blood | G.K10; G.K12 |
| | 13, 14. Ureogenesis, AAs metabolism | G.K9; G.K10; G.K12 |
| | 15. Metabolism of purines, pyrimidines | G.K9; G.K12 |
| | 16. Vitamins and hormones | G K9; G.K10; G.K11; G.K12; |
| | 17. Metabolism in the liver, biotransformation | G.K9; G.K10; G.K12; G.S4 |
| Classes | 1. Basic laboratory techniques | G.S5; G.S6; G.S7 |
| | 2. Acid – base balance in organism, buffers | G.K2; G.S1; G.S3; G.S5; G.S6;G.S7 |
| | 3. Qualitative analysis of organic compound | G.K3; G.K4; G.S5; G.S6; G.S7 |
| | 4. Amino acids and proteins | G.K4; G.S5; G.S6; G.S7 |
| | 5. Proteins, properties and methods of separation | G.S5; G.S6; G.S7 |
| | 6. Enzymes | G.S4; G.S5; G.S6; G.S7 |

| | | |
|---|---|---|
| | 7. Enzymes - kinetics | G.S4; G.S5; G.S6; G.S7 |
| | 8. Nucleic acids | G.K7; G.S5; G.S6; G.S7 |
| | 9. Carbohydrates - chemical properties | G.K5; G.S5; G.S6; G.S7 |
| | 10. Carbohydrates – biochemical properties | G.K5; G.S5; G.S6; G.S7 |
| | 11. Lipids | G.K5; G.S5; G.S6; G.S7 |
| | 12. Digestive enzymes | G.K10; G.S5; G.S6; G.S7 |
| | 13. Blood constituents | G.K10; G.K12; G.S5; G.S6; G.S7 |
| | 14. Urine constituents | G.K10; G.K12; G.S5; G.S6; G.S7 |
| | 15. Biochemistry all around us | G.S5; G.S6; G.S7 |
| | | |

## 7. LITERATURE

**Obligatory**

1. General Chemistry with Qualitative Analysis – Whitten, Davis, Peck, VI ed., Saunders College Publishing.
2. Introduction to Organic Chemistry – Brown, W.H. Saunders College Publishing.
3. Biochemistry Lippincott's Illustrated Reviews, D.R. Ferrier (R.A. Harvey ed.), Wolters Kluwer, Lippincott,Williams & Wilkins.
4. Harpers' biochemistry, R.K. Murray, D.K. Granner, P.A. Mayers, V.W. Rodwell, Appleton & Lange.

**Supplementary**

1. An Introduction to Medicinal Chemistry, L.P. Graham, Oxford University Press.
2. Biochemistry. L. Stryer, W.H. Freeman & Company, New York.
3. Principles of Medical Biochemistry, G. Meisenberg, W.H. Simmons, Elsevier (online access + interactive extras, studentconsult.com).
4. Medical Biochemistry, J.W. Baynes, M.H. Dominiczak, Elsevier, (online access + interactive extras, studentconsult.com). Last edition.
5. Textbook of Biochemistry with clinical correlations, T.M. Devlin, Willey-Liss, Inc.

## 8. VERIFYING THE EFFECT OF LEARNING

| Code of the course effect of learning | Ways of verifying the effect of learning | Completion criterion |
|---|---|---|
| *e.g. G.K1, G.S1, K1* | *This field defines the methods used for grading students e.g. pop quiz, test, written report etc.* | *e.g. threshold number of points* |
| G.K1 - G.K12<br>G.S1 - G.S3 | Continuous assessment during seminars – weekly tests | At least 60% of points<br><br>Active discussion during seminars |
| | Intermediate assessment tests (3)<br>Final exam (test, 100 questions) | At least 55% of points |
| G.K2; G.K3; G.K4; G.K5; G.7; G.K10; G.K12<br><br>G.S1 - G.S7 | Continuous assessment during laboratory classes – weekly tests | At least 60% of points |
| | Written laboratory reports | Credit by the teacher |

**9. ADDITIONAL INFORMATION** *(information essential for the course instructor that are not included in the other part of the course syllabus e.g. if the course is related to scientific research, detailed description of, information about the Science Club)*

The Student is obligated to:
- attend all lectures, laboratory classes, seminars, and intermediate assessments (being late for over 15 minutes is treated as an absence)
- be prepared and participate in discussions during seminars and laboratory classes
- use university e-mail addresses s0xxxxx@student.wum.edu.pl

It is not allowed:
- to copy lab reports, assignments, test or exam answers
- to allow that someone else could copy another Student's report/assignments/test/exam
- to use electronic devices to communicate or store data during the test or exam
- to impersonate or to use the login or password of another Student

Absence due to illness is excused only by a medical note/doctor's certificate, which must be shown/sent to the course coordinator as soon as possible (no later than within a week). Unexcused absences may result in failing the entire course of biochemistry. Unexcused absence from the intermediate assessment/s or exam means failing.

Students can get the credit for the whole course and take the final exam if she/he credits laboratory classes, seminars, and assessment tests.

Grading:
0 - 54 % - 2.0
55 - 63 % - 3.0
64 - 73 % - 3.5
74 - 83 % - 4.0
84 - 92 % - 4.5
93 - 100 % - 5.0

The final grade may be increased by additional points in the case of good results of the intermediate tests:
- the average grade 4.75-5.00: 5 points
- the average grade 4.50-4.74: 3 points
- the average grade 4.25-4.49: 2 points

Signature of the Head of Educational Unit

Prof. dr hab. Marta Struga

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# *GENETICS - BASIC*

| **1. IMPRINT** | |
|---|---|
| **Academic Year** | 2021/22 |
| **Department** | Faculty of Medicine |
| **Field of study** | Medicine |
| **Main scientific discipline** *(in accord with appendix to the Regulation of Minister of Science and Higher education from 26th of July 2019)* | **Medical science** |
| **Study Profile** *(general academic / practical)* | General academic |
| **Level of studies** *(1st level /2nd level/ uniform MSc)* | Uniform MSc |
| **Form of studies** | **Full time studies** |
| **Type of module / course** *(obligatory / non-compulsory)* | **Obligatory** |
| **Form of verification of learning outcomes** *(exam / completion)* | **Credit** |
| **Educational Unit / Educational Units** *(and address / addresses of unit / units)* | **Department of Medical Genetics 1WY**<br>**Center for Biostructure Research, First Faculty of Medicine**<br>**ul. Pawińskiego 3c, 02-106 Warszawa**<br>**phone: +48 22 572 06 95, fax: +48 22 572 06 96**<br>**http://www.genetyka.wum.edu.pl**<br>**mail: krzysztof.szczaluba@wum.edu.pl** |

| | |
|---|---|
| **Head of Educational Unit / Heads of Educational Units** | **Head of the Department: Rafał Płoski MD PhD** |
| **Course coordinator** *(title, First Name, Last Name, contact)* | **Krzysztof Szczaluba MD PhD**<br>**krzysztof.szczaluba@wum.edu.pl**<br>**tel. 22 572 06 95** |
| **Person responsible for syllabus** *(First name, Last Name and contact for the person to whom any objections concerning syllabus should be reported)* | **Krzysztof Szczaluba MD PhD**<br>**krzysztof.szczaluba@wum.edu.pl**<br>**tel. 22 572 06 95** |
| **Teachers** | **Rafał Płoski MD PhD**<br>**Joanna Kosińska PhD**<br>**Agnieszka Pollak PhD**<br>**Małgorzata Rydzanicz PhD**<br>**Piotr Gasperowicz MSc**<br>**Anna Walczak MSc**<br>**Karolina Rutkowska MSc** |

## 2. BASIC INFORMATION

| | | | |
|---|---|---|---|
| **Year and semester of studies** | 2nd year, 4th semester | **Number of ECTS credits** | 2.00 |

| FORMS OF CLASSES<br>**Contacting hours with academic teacher** | **Number of hours** | **ECTS credits calculation** |
|---|---|---|
| Lecture (L) | - | - |
| Seminar (S) | 8 (e-learning:8) | 0.55 |
| Classes (C) | 17 (live, contact classes:17) | 1.12 |
| e-learning (e-L) | - | - |
| Practical classes (PC) | - | - |
| Work placement (WP) | - | - |
| **Unassisted student's work** | | |
| Preparation for classes and completions | 5 | 0.33 |

## 3. COURSE OBJECTIVES

| | |
|---|---|
| O1 | The aim of the course is to present theoretical and laboratory basics of medical and clinical genetics. In the course, the main focus is on teaching how to make use of the obtained knowledge in practice. |
| O2 | Students will also learn to interpret basic genetic analysis, understand principles of genetics counselling and will be acquainted with basic laboratory and statistical methods used in the research in the field of human genetics. |

**4. STANDARDS OF LEARNING – DETAILED DESCRIPTION OF EFFECTS OF LEARNING** *(concerns fields of study regulated by the Regulation of Minister of Science and Higher Education from 26 of July 2019; does not apply to other fields of study)*

| **Code and number of effect of learning in accordance with standards of learning** *(in accordance with appendix to the Regulation of Minister of Science and Higher education from 26th July 2019)* | **Effects in time** |
|---|---|
| **Knowledge – Graduate* knows and understands:** | |
| B.W13 | functions of nucleotides in the cell, the structure of I and II DNA and RNA and the structure of chromatin |
| B.W14 | functions of the genome, transcriptome and human proteome and the basic methods used in their study; processes of replication, repair and recombination of DNA, transcription and translation and degradation of DNA |
| C.W1 | basic terms in the field of genetics |
| C.W2 | phenomena of genes linkage and interactions |
| C.W4 | the structure of chromosomes and molecular basis of mutagenesis |
| C.W5 | the principles of inheritance different number of traits, inheritance of quantitative traits, independent inheritance of traits and inheritance of extranuclear genetic information. |
| C.W6 | genetic conditions of human blood groups and the Rhesus incompatibility |
| C.W8 | factors which influence the primary and secondary genetic balance of population |
| **Skills– Graduate* is able to:** | |
| C.U1 | analyse genetic crosses and pedigrees of human traits and diseases and estimate the risk of giving birth to a child with chromosomal aberrations |
| C.U4 | conduct morphometric measurements, analyse morphograms and record disease karyotypes |
| C.U5 | assess the risk of giving birth to an affected child based on family predispositions and influence of environmental factors |

** In appendix to the Regulation of Minister of Science and Higher education from 26th of July 2019 „graduate", not student is mentioned.*

**5. ADDITIONAL EFFECTS OF LEARNING** *(non-compulsory)*

| **Number of effect of learning** | **Effects of learning i time** |
|---|---|
| **Knowledge – Graduate knows and understands:** | |
| K1 | Student is able to work in a group in order to solve a problem from the field of genetics. |

**6. CLASSES**

| Form of class | Class contents | Effects of Learning |
|---|---|---|
| Seminars & Practice | 1. Basics of genetic medical history and pedigree analysis. Modes of inheritance in human. Genomic imprinting. Drawing pedigrees based on clinical cases. Analysis of modes of inheritance<br><br>2. Calculating genetic risk in multifactorial diseases. Applicability of RR and OR in medical genetics. Calculating reoccurrence risk in monogenic diseases. Empirical estimation of disease likelihood in a family using Bayes theory<br><br>3. Usefulness of LR calculation in medical genetics. Calculating likelihood of pedigrees<br><br>4. De novo mutations. Calculating genetic risk considering mutagenesis<br><br>5. Genes identification and mapping. Linkage analysis<br><br>6. Introduction to cytogenetic testing. Chromosomal basis of human diseases. Methods in molecular cytogenetics. Analysis of cytogenetic results. Using online databases in CGH analysis 7. Personalized medicine – whole-genome sequencing of DNA. Analysis of DNA sequencing results | B.W13<br>B.W14<br>C.W1<br>C.W2<br>C.W4<br>C.W5<br>C.W6<br>C.W8<br>C.U1<br>C.U4<br>C.U5 |

## 7. LITERATURE

| **Obligatory** |
|---|
| Medical Genetics<br>Jorde, Carey, Bamshad<br>4th Edition<br>Elsevier |
| **Supplementary** |
| - |

## 8 VERIFYING THE EFFECT OF LEARNING

| Code of the course effect of learning | Ways of verifying the effect of learning | Completion criterion |
|---|---|---|
| *e.g. G.K1, G.S1, K1* | *This field defines the methods used for grading students e.g. pop quiz, test, written report etc.* | *e.g. threshold number of points* |
| C.U1, C.U5, K1 | Report from completed task | Solving correctly a given task (drawing a pedigree based on clinical description of a family; interpreting a result of a genetic testing; calculating genetic risk; defining a term; explaining a biological process) |
| C.W1-C.W8, C.U1, C.U5 | Credit (test) | Answering correctly to more than 50% of questions |

***9*** **ADDITIONAL INFORMATION** *(information essential for the course instructor that are not included in the other part of the course syllabus e.g. if the course is related to scientific research, detailed description of, information about the Science Club)*

**Students are obliged to attend all seminars and classes. No absence is accepted during classes and seminars. Each absence on classes and seminars would have to be covered with another group. Change of groups is possible only as an exchange with a person from another group. Being late for over 15 minutes counts as an absence.**

**Person responsible for students affairs: Krzysztof Szczaluba MD PhD krzysztof.szczaluba@wum.edu.pl , krzysztof.szczaluba@gmail.com**

| **Evaluation criteria** | |
|---|---|
| **Form of passing the course:** *passing without a grade* | |
| Pass | Criteria |
| **Not passed** | Getting 50% of points or less |
| **Passed** | Getting more than 50% of points |

# Hygiene and Epidemiology

| 1. IMPRINT | |
|---|---|
| **Academic Year** | 2021/2022 |
| **Department** | Faculty of Medicine |
| **Field of study** | Medicine |
| **Main scientific discipline** *(in accord with appendix to the Regulation of Minister of Science and Higher education from 26th of July 2019)* | **Medical science** |
| **Study Profile** *(general academic / practical)* | General academic |
| **Level of studies** *(1st level /2nd level/ uniform MSc)* | Uniform MSc |
| **Form of studies** | **Full-time studies** |
| **Type of module / course** *(obligatory / non-compulsory)* | **obligatory** |
| **Form of verification of learning outcomes** *(exam / completion)* | **credit** |
| **Educational Unit / Educational Units** *(and address / addresses of unit / units)* | Department of Epidemiology and Biostatistics<br>Zakład Epidemiologii i Biostatystyki<br>ul. Oczki 3, 02-007 Warszawa<br>tel 22 629 02 43<br>e-mail epidemiologia@wum.edu.pl |

| | |
|---|---|
| **Head of Educational Unit / Heads of Educational Units** | dr hab. n. med. Joanna Peradzyńska |
| **Course coordinator** *(title, First Name, Last Name, contact)* | dr hab. n. med. Joanna Peradzyńska<br>**joanna.peradzynska@wum.edu.pl** |
| **Person responsible for syllabus** *(First name, Last Name and contact for the person to whom any objections concerning syllabus should be reported)* | dr hab. n. med. Joanna Peradzyńska |
| **Teachers** | dr hab. n. med. Joanna Peradzyńska<br>dr hab. n. med. Katarzyna Pancer<br>dr n. med. Daniel Rabczenko<br>dr n. hum. Cecylia Łabanowska |

## 2. BASIC INFORMATION

| | | | |
|---|---|---|---|
| **Year and semester of studies** | 2 nd year 3rd semester | **Number of ECTS credits** | 2.00 |

| FORMS OF CLASSES<br>**Contacting hours with academic teacher** | **Number of hours** | **ECTS credits calculation** |
|---|---|---|
| Lecture (L) | | |
| Seminar (S) | 10 | 0,4 |
| Classes (C) | 20 | 1,0 |
| e-learning (e-L) | | |
| Practical classes (PC) | | |
| Work placement (WP) | | |
| **Unassisted student's work** | | |
| Preparation for classes and completions | 15 | 0,6 |

## 3. COURSE OBJECTIVES

| | |
|---|---|
| O1 | Explaining of community health, its basic manifestations, presentation of health patterns and causes of health problems in a population. |

| | |
|---|---|
| O2 | Presentation of population health demands and examinations of the most common health deficiencies population methods of investigation. |
| O3 | Learning how to determine the frequency of specific health problems, identify patterns in occurrences of the problem, identify any potential causes and risk factors, evaluate the efficacy of preventative measures and treatments |

**4.** **STANDARDS OF LEARNING – DETAILED DESCRIPTION OF EFFECTS OF LEARNING** *(concerns fields of study regulated by the Regulation of Minister of Science and Higher Education from 26 of July 2019; does not apply to other fields of study)*

| | |
|---|---|
| **Code and number of effect of learning in accordance with standards of learning** *(in accordance with appendix to the Regulation of Minister of Science and Higher education from 26th of July 2019)* | **Effects in time G.W.1, G.W,2, G.W.3 G.U.1, G.U.2, G.U.3, G.U.4.** |
| **Knowledge – Graduate* knows and understands:** | |
| G.W.1 | knows health assessment methods of an individual and of community, disease, and medical procedures classification |
| G.W.2 | knows ways of identification of risk factors, advantages and disadvantages of different epidemiological study methods and cause relation measures |
| G.W.3 | knows epidemiology of communicable and chronic diseases, methods of prevention, the disease course, can assess country epidemiological condition of common diseases |
| **Skills– Graduate* is able to:** | |
| G.U.1, G.U.4 | Can describe the demographic structure of the community and basing on it is able to describe population health problems, is able to assess country epidemiological condition of common diseases |
| G.U.2, G.U.3 | Can collect information of the risk factors and is able to plan prophylactic programs basin on various levels of prevention |

** In appendix to the Regulation of Minister of Science and Higher education from 26th of July 2019 „graduate", not student is mentioned.*

**5.** **ADDITIONAL EFFECTS OF LEARNING** *(non-compulsory)*

| **Number of effect of learning** | **Effects of learning i time** |
|---|---|
| **Knowledge – Graduate knows and understands:** | |
| K1 | |
| K2 | |
| **Skills– Graduate is able to:** | |

| | |
|---|---|
| S1 | |
| S2 | |
| **Social Competencies – Graduate is ready for:** | |
| SC1 | |
| SC2 | |

## 6. CLASSES

| Form of class | Class contents | Effects of Learning |
|---|---|---|
| Seminars<br><br>Classes | Epidemiology - definition basic concepts and aim.<br>Types of epidemiological studies, advantages and disadvantages.<br>Descriptive, analytic, and experimental epidemiology.<br>Screening studies.<br>Community health measures in epidemiology.<br>Data sources of population health.<br>Epidemiological study interpretation.<br>Epidemiology of communicable diseases. Vaccination.<br>Methods of community health monitoring.<br>Computer systems and data bases in healthcare.<br>Creation national and international data bases.<br>Aging as a medical and social problem.<br>Selected health problem global and student's country epidemiology – presentation prepared by students.<br><br>Description of population health status basing on official statistical reports, disease registers and designed studies. Health status in time and space evolution, health perspective of national and world population.<br>Prophylaxis and clinical aspects in diagnosing and treatment early stage of diseases of chronic diseases. Mass and selective screening tests of early stages of chronic, genetic and congenital diseases.<br>Health conditions. Disease causation - recognizing methods.<br>Risk factors.<br>Basic types of epidemiological phenomenon: epidemic, endemic, pandemic, epidemic process, epidemiological surveillance.<br>Communicable disease situation in the world.<br>Basics of environmental epidemiology.<br>Clinical and epidemiological study methodology.<br>Statistical methods use.<br>The role of clinical observations and epidemiological cross-sectional study in disease causation hypothesis formulation.<br>Case control studies and cohort studies in disease etiology inquiring.<br>The role of clinical experiment (controlled clinical studies) in assessment of medical management efficacy - basic of clinical epidemiology. Relative risk, odds ratio.<br>Examples of disease fights in population based on communicable diseases and other health wellness deviations of known external etiology. Critical literature review.<br>**Student's presentations - topics provided teacher at first meeting. Health problem: global and student's country epidemiology.** | **G.W.1,**<br>**G.W,2,**<br>**G.W.3**<br>**G.U.1,**<br>**G.U.2,**<br>**G.U.3,**<br>**G.U.4.** |

## 7. LITERATURE

**Obligatory**

1. R. Bonita, R. Beaglehole, T. Kjellström Basic Epidemiology 2nd Edition
   https://apps.who.int/iris/bitstream/handle/10665/43541/9241547073_eng.pdf;jsessionid=BF5A6A5D88A012B0687A3FE1E800E0F6?sequen

**Supplementary**

1. G.D. Fiedman Primer of Epidemiology. McGraw-Hill, New York (available in the Institute)
2. L. Gordis. Epidemiology. Elsviere Saunders
3. www.who.org

## 8. VERIFYING THE EFFECT OF LEARNING

| Code of the course effect of learning | Ways of verifying the effect of learning | Completion criterion |
|---|---|---|
| *eg. G.K1, G.S1, K1* | *This field defines the methods used for grading students e.g. pop quiz, test, written report etc.* | *e.g. threshold number of points* |
| G.W1, G.W.2, G.W3, G.U.1, G.U.2 | Final MCQ test – 30 questions – WUM e-learning platform<br>Student presentation on selected epidemiological topic. | Min 60% correct answers<br>Positive teacher's assessment |

## 9. ADDITIONAL INFORMATION *(information essential for the course instructor that are not included in the other part of the course syllabus e.g. if the course is related to scientific research, detailed description of, information about the Science Club)*

# Medical Communication

| 1. IMPRINT | |
|---|---|
| **Academic Year** | 2021/2022 |
| **Department** | Faculty of Medicine |
| **Field of study** | Medicine |
| **Main scientific discipline** *(in accord with appendix to the Regulation of Minister of Science and Higher education from 26th of July 2019)* | **Medical science** |
| **Study Profile** *(general academic / practical)* | General academic |
| **Level of studies** *(1st level /2nd level/ uniform MSc)* | Uniform MSs |
| **Form of studies** | **Full time studies** |
| **Type of module / course** *(obligatory / non-compulsory)* | **Obligatory** |
| **Form of verification of learning outcomes** *(exam / completion)* | **Credit** |
| **Educational Unit / Educational Units** *(and address / addresses of unit / units)* | Zakład Psychologii i Komunikacji Medycznej [Department of Medical Psychology & Medical Communication] (DMP&MC) - practicals<br>ul. Litewska 14/16, 00-575 Warszawa, Tel. +48 22 116 92 11<br><br>Studium Komunikacji Medycznej [Department of Medical Communication (DMC) – e-learning lectures<br>ul. Żwirki i Wigury 81, 02-091 Warszawa, Tel.22 5720578 |

| | |
|---|---|
| **Head of Educational Unit / Heads of Educational Units** | DMP&MC: Professor Krzysztof Owczarek, MA, PhD<br><br>DMC: Antonina Doroszewska, MA, PhD |
| **Course coordinator** *(title, First Name, Last Name, contact)* | Magdalena Łazarewicz, MA, PhD<br>magdalena.lazarewicz@wum.edu.pl |
| **Person responsible for syllabus** *(First name, Last Name and contact for the person to whom any objections concerning syllabus should be reported)* | Magdalena Łazarewicz, MA, PhD<br>magdalena.lazarewicz@wum.edu.pl |
| **Teachers** | Practicals:<br>Magdalena Łazarewicz, MA, PhD (magdalena.lazarewicz@wum.edu.pl)<br>Joanna Chylińska, MA, PhD (joanna.chylinska@wum.edu.pl)<br>Jakub Związek, MA (jakub.zwiazek@wum.edu.pl)<br>Marcin John, MA (marcin.john@gmail.com)<br><br>E-learning lecture:<br>Anna Kołodziejek, MD (anna.kolodziejek@wum.edu.pl) |

## 2. BASIC INFORMATION

| | | | |
|---|---|---|---|
| **Year and semester of studies** | II year, 2nd semester | **Number of ECTS credits** | 1.00 |

| FORMS OF CLASSES<br>**Contacting hours with academic teacher** | **Number of hours** | **ECTS credits calculation** |
|---|---|---|
| Lecture (L) | - | |
| Seminar (S) | - | |
| Discussions (D) | 12 | 0.4 |
| e-learning (e-L) | 20 | 0.4 |
| Practical classes (PC) | - | |
| Work placement (WP) | - | |
| **Unassisted student's work** | | |
| Preparation for classes and completions | 5 | 0.2 |

## 3. COURSE OBJECTIVES

| | |
|---|---|
| O1 | During the course student acquires knowledge and skills on the basic psychological aspects of the medical interviewing, becomes familiar with the Calgary Cambridge model of communication and is able to apply its' selected elements. |

| | |
|---|---|
| O2 | The student understands why good communication skills are important in medical practice and knows how to develop good rapport with patients and their families; is aware of different models of doctor-patient interactions and understands their consequences for medical outcomes. |
| O3 | The student gains basic knowledge and skills in verbal and nonverbal communication. |
| 04 | The student understands and applies principles of effective interpersonal communication in medical context: uses various techniques of active listening: open- and closed ended questions, facilitation, checking, clarification, summarising. |
| 05 | The student understands what empathy is and how to express it, is able to reflect and legitimate emotions, elicit patient's concerns, ideas and expectations; know how to provide emotional support. |

**4.** **STANDARDS OF LEARNING – DETAILED DESCRIPTION OF EFFECTS OF LEARNING** *(concerns fields of study regulated by the Regulation of Minister of Science and Higher Education from 26 of July 2019; does not apply to other fields of study)*

| **Code and number of effect of learning in accordance with standards of learning** *(in accordance with appendix to the Regulation of Minister of Science and Higher education from 26th of July 2019)* | **Effects in time** |
|---|---|
| **Knowledge – Graduate* knows and understands:** | |
| D.K5 | the rules and methods of communication with the patient and his family, which are used to build an empathic, trust-based relationship |
| D.K6 | the role of good verbal and nonverbal communication in doctor-patient interaction, the meaning of trust in the interaction with patients |
| D.K15 | the principles of motivating the patient to promote healthy behaviour and informing about unfavourable prognosis |
| **Skills– Graduate* is able to:** | |
| D.S1 | include patient's subjective needs and expectations resulting from socio-cultural background in the entire therapeutic process |
| D.S4 | builds the atmosphere of trust during the treatment process |
| D.S5 | conduct the consult with the patient with the use of empathy and active listening; is able to discuss patient's life situation |
| D.S11 | applies basic psychological motivational and supportive interventions |

** In appendix to the Regulation of Minister of Science and Higher education from 26th of July 2019 „graduate", not student is mentioned.*

**5.** **ADDITIONAL EFFECTS OF LEARNING** *(non-compulsory)*

| **Number of effect of learning** | **Effects of learning i time** |
|---|---|

| | |
|---|---|
| **Knowledge – Graduate knows and understands:** | |
| K1 | - |
| K2 | - |
| **Skills– Graduate is able to:** | |
| S1 | - |
| S2 | - |
| **Social Competencies – Graduate is ready for:** | |
| SC1 | - |
| SC2 | - |

## 6. CLASSES

| Form of class | Class contents | Effects of Learning |
|---|---|---|
| *e-L* | Functions of medical communication. Communication and patient satisfaction. The role of empathy in doctor-patient relationship. Methods of communication. Communication barriers and errors. Medical interview. Breaking bad news. Communication in medical team. Difficult conversations with patients. Motivational interviewing. | *D.K5*<br>*D.K6*<br>*D.K15* |
| C1 | Basic skills in medical communication (1) – the importance of communication for medical outcomes; basic rules of building a good doctor-patient/family relationship: verbal and nonverbal aspects of communication; showing respect and building rapport; eliciting patient's perspective; active listening skills in gathering information; questioning techniques | D.K5<br>D.K6<br>D.S1<br>D.S4 |
| C2 | Basic skills in medical communication (2) – educating and explaining in medical practice; including patient's perspective in the treatment process, discussing treatment with patients | D.S1<br>D.S4<br>D.S5 |
| C3 | Empathy and support - responding to patient's expectations and needs with empathy, eliciting and validating emotional state of patients during treatment process, giving emotional support to patients, | D.S1<br>D.S4<br>D.S5<br>D.S11 |

## 7. LITERATURE

**Obligatory**

PDF materials provided by the teacher during the course; materials provided withing the e-learning

**Supplementary**


- Silverman, J., Kurtz, S, Draper J (2008) Skills for Communicating with Patients. Radcliffe Publishing.
- Lloyd, M., Bor R., Noble, L. (2019) Clinical Communication Skills for Medicine. Elsevier.

## 8. VERIFYING THE EFFECT OF LEARNING

| Code of the course effect of learning | Ways of verifying the effect of learning | Completion criterion |
|---|---|---|
| *D.K5, D.K6, D.S1, D.S4, D.S5, D.S11* | *Active participation in all exercises during classes* | Minimal acceptable level of performance |
| *D.K5, D.K6, D.K15* | *Completing the e-learning course and submitting the written exercise required in the e-learning course* | Minimal acceptable level of performance |

## 9. ADDITIONAL INFORMATION *(information essential for the course instructor that are not included in the other part of the course syllabus e.g. if the course is related to scientific research, detailed description of, information about the Science Club)*

The e-learning lectures are held on MUW e-learning platform.

The class is intendent as practical and is based on experiential learning. The outcomes of that process are strongly related to active participation in all in-class activities, therefore attendance is mandatory. Students will be allowed to make up missed work in case of an excused absence. In such cases students should notify the teacher as soon as possible to establish the way of covering the absence. Change of subgroups is possible only after consulting the teacher in advance.
Students are expected to come to the class on time and participate actively. Being late for over 15 minutes counts as an absence. Recurring tardiness will result in additional work – an essay or short review of literature (based on the decision of the teacher, depending on the missed material). To provide good learning environment for everyone, students are requested to turn off any electronic devices that might disturb the class.

To complete the course students are required to be present at all classes (with a possibility to come with another group in case of absence – after teachers approval), participate actively in all exercises, complete the e-learning course and submit the written exercise required in the e-learning course.

Contact information to the course coordinator:
Magdalena Łazarewicz, MA, PhD
magdalena.lazarewicz@wum.edu.pl

The Department of Medical Psychology and Medical Communication runs the Psychological Students Science Club “Psyche” (in English) (contact information: magdalena.lazarewicz@wum.edu.pl).

# Medical Ethics with Elements of Philosophy

| 1. IMPRINT | |
|---|---|
| **Academic Year** | 2021/2022 |
| **Department** | Faculty of Medicine |
| **Field of study** | Medicine |
| **Main scientific discipline** *(in accord with appendix to the Regulation of Minister of Science and Higher education from 26th of July 2019)* | **Medical science** |
| **Study Profile** *(general academic / practical)* | General academic |
| **Level of studies** *(1st level /2nd level/ uniform MSc)* | Uniform MSc |
| **Form of studies** | **Full time studies** |
| **Type of module / course** *(obligatory / non-compulsory)* | **Obligatory** |
| **Form of verification of learning outcomes** *(exam / completion)* | **credit** |
| **Educational Unit / Educational Units** *(and address / addresses of unit / units)* | Department of Medical Ethics and Palliative Medicine (2MC), Litewska St. 14/16, 02-672 Warsaw, Poland; e-mail: zaklad-bioetyki@wum.edu.pl, tel. 48 22 116 9234 |

| | |
|---|---|
| **Head of Educational Unit / Heads of Educational Units** | Prof. dr hab. Tomasz Pasierski |
| **Course coordinator** *(title, First Name, Last Name, contact)* | **dr Agata Łukomska**<br>**Agata.lukomska@uw.edu.pl** |
| **Person responsible for syllabus** *(First name, Last Name and contact for the person to whom any objections concerning syllabus should be reported)* | **dr Agata Łukomska**<br>**agata.lukomska@uw.edu.pl** |
| **Teachers** | **dr Agata Łukomska** |

## 2. BASIC INFORMATION

| | | | |
|---|---|---|---|
| **Year and semester of studies** | II year, 3 semester | **Number of ECTS credits** | 2.00 |

| FORMS OF CLASSES<br>**Contacting hours with academic teacher** | **Number of hours** | **ECTS credits calculation** |
|---|---|---|
| Lecture (L) | 18 | 0,96 |
| Seminar (S) | 12 | 0,44 |
| Classes (C) | | |
| e-learning (e-L) | | |
| Practical classes (PC) | | |
| Work placement (WP) | | |
| **Unassisted student's work** | | |
| Preparation for classes and completions | 12 | 0,6 |

## 3. COURSE OBJECTIVES

| | |
|---|---|
| O1 | To acquaint the student with the philosophical basis of scientific medical knowledge |
| O2 | To acquaint the student with the basics of physician ethics. |
| O3 | To develop the basic skills necessary for independent analysis of ethical problems in medicine |

| **4.** **STANDARDS OF LEARNING – DETAILED DESCRIPTION OF EFFECTS OF LEARNING** *(concerns fields of study regulated by the Regulation of Minister of Science and Higher Education from 26 of July 2019; does not apply to other fields of study)* | |
|---|---|
| **Code and number of effect of learning in accordance with standards of learning** *(in accordance with appendix to the Regulation of Minister of Science and Higher education from 26th of July 2019)* | **Effects in time** |
| **Knowledge – Graduate* knows and understands:** | |
| G.K1 | the functioning of health care systems and the physician's social role; D.W8 |
| G.K2 | the main concepts, theories and ethical principles which provide the framework for correct interpretation and analysis of moral-medical questions; DW16 |
| G. K3 | patient rights; D.W17 |
| G.K4 | the foundations of evidence based medicine; D.W23 |
| **Skills– Graduate* is able to:** | |
| G.S1 | inform the patient on the aims, process and possible risk of the proposed diagnostic and therapeutic interventions and obtain the patient's informed consent; D.U6 |
| G.S2 | observe the ethical requirements in professional activities; D.U13 |
| G. S3 | recognize the ethical dimension of medical decisions and discern the facts from norms; D.U14 |
| G.S4 | respect patient rights; D.U15 |

** In appendix to the Regulation of Minister of Science and Higher education from 26th of July 2019 „graduate", not student is mentioned.*

| **5.** **ADDITIONAL EFFECTS OF LEARNING** *(non-compulsory)* | |
|---|---|
| **Number of effect of learning** | **Effects of learning i time** |
| **Knowledge – Graduate knows and understands:** | |
| K1 | |
| K2 | |
| **Skills– Graduate is able to:** | |
| S1 | |

| | |
|---|---|
| S2 | |

**Social Competencies – Graduate is ready for:**

| | |
|---|---|
| SC1 | |
| SC2 | |

## 6. Classes

| Form of class | Class contents | Effects of Learning |
|---|---|---|
| L1 - lecture | Philosophy and its main subdisciplines. Knowledge and types of science. Inductive inference. Humanities. Basics of philosophy of science. Theories of truth. | G.K4 |
| L2 - lecture | Philosophical and methodological foundations of EBM. Ethics and medical professionalism | G.K4 |
| L3 - lecture | Philosophical ethical theories. | G.K2, G.S3 |
| L4 - lecture | Ethical regulation in medicine. Justice in healthcare and patient's rights. | G.K2, G.K3, G.S3 |
| L5 - lecture | Physician-patient relationship and informed consent. Patient's decisional competency | GK.1, GK.2 |
| L6 - lecture | Physician's professional autonomy. Medical paternalism. Truthfulness and confidentiality. | G.K1 G.K2, G.K3 |
| S1 - seminar | Medical professionalism | G.K1, G.S2 |
| S2 - seminar | Informed consent to medical services. Patient's autonomy and decisional competency. | GK.2, G.K3, GS.1, G.S2, G.S3, G.S4 |
| S3 - seminar | Physician's professional autonomy. Medical confidentiality. | G.K1, G.K2, G.K3, G.S1, G.S2, G.S3, G.S4 |
| S4 - seminar | Patient's privacy. Ethics of the beginnings of life. | G.K2, G.K3, G.S1, G.S2, G.S3, G.S4 |
| S5 - seminar | Conflict of interest in healthcare. | G.K1, G.K2, G.K3, G.S2, G.S3, G.S4 |
| S6 - seminar | Ethical problems in pediatrics. The ethics of the end of life issues. | G.K2, G.K3, G.S1, G.S2, G.S3, G.S4 |

## 7. Literature

**Obligatory**

T. L. Beauchamp, J. F. Childress, Principles of Biomedical Ethics, Oxford University Press 1994 (fourth edition), chap. 3-7.

| **Supplementary** |
|---|
| Scholarly journal articles selected for particular seminars. List of readings will be provided during first seminar. |

**8. VERIFYING THE EFFECT OF LEARNING**

| Code of the course effect of learning | Ways of verifying the effect of learning | Completion criterion |
|---|---|---|
| *e.g. G.K1, G.S1, K1* | *This field defines the methods used for grading students e.g. pop quiz, test, written report etc.* | *e.g. threshold number of points* |
| G.K1-G.K6 | Multiple choice test. | 60% correct answers |
| G.S1-G.S6 | Correct analysis of a medical ethical case during class presentation. | Acquisition of the skill at an acceptable level. |

**9. ADDITIONAL INFORMATION** *(information essential for the course instructor that are not included in the other part of the course syllabus e.g. if the course is related to scientific research, detailed description of, information about the Science Club)*

# BASIC POLISH FOR MEDICINE

| 1. IMPRINT | |
|---|---|
| **Academic Year** | 2021/2022 |
| **Department** | Faculty of Medicine |
| **Field of study** | Medicine |
| **Main scientific discipline** *(in accord with appendix to the Regulation of Minister of Science and Higher education from 26th of July 2019)* | **Medical science** |
| **Study Profile** *(general academic / practical)* | **General academic** |
| **Level of studies** *(1st level /2nd level/ uniform MSc)* | **Uniform MSc** |
| **Form of studies** | **Full-time studies** |
| **Type of module / course** *(obligatory / non-compulsory)* | **Obligatory** |
| **Form of verification of learning outcomes** *(exam / completion)* | **Credit** |
| **Educational Unit / Educational Units** *(and address / addresses of unit / units)* | **Foreign Language Department**<br>**The Didactic Center, ul. Trojdena 2a., 02-109 Warsaw**<br>**sjosekretariat@wum.edu.pl, tel. 22 5720863**<br>**www.sjo.wum.edu.pl/** |

| | |
|---|---|
| **Head of Educational Unit / Heads of Educational Units** | Maciej Ganczar, PhD |
| **Course coordinator** *(title, First Name, Last Name, contact)* | **Anna Maczkowska, MA**<br>**amaczkowska@wum.edu.pl** |
| **Person responsible for syllabus** *(First name, Last Name and contact for the person to whom any objections concerning syllabus should be reported)* | **Anna Maczkowska, MA**<br>**amaczkowska@wum.edu.pl** |
| **Teachers** | **Maciej Ganczar, PhD**<br>**Anna Maczkowska, MA** |

## 2. BASIC INFORMATION

| | | | |
|---|---|---|---|
| **Year and semester of studies** | 2nd, winter and summer semester | **Number of ECTS credits** | 5.00 |

| FORMS OF CLASSES<br>**Contacting hours with academic teacher** | **Number of hours** | **ECTS credits calculation** |
|---|---|---|
| Lecture (L) | | |
| Seminar (S) | | |
| Classes (C) | 80 | 3 |
| e-learning (e-L) | | |
| Practical classes (PC) | | |
| Work placement (WP) | | |
| **Unassisted student's work** | | |
| Preparation for classes and completions | 160 | 2 |

## 3. COURSE OBJECTIVES

| | |
|---|---|
| O1 | The 2nd year Polish language course is designed to improve the students' command of the language and provide them with basic medical terminology and skills to communicate with an adult and paediatric patient at elementary level. |

| **4.** **STANDARDS OF LEARNING – DETAILED DESCRIPTION OF EFFECTS OF LEARNING** *(concerns fields of study regulated by the Regulation of Minister of Science and Higher Education from 26 of July 2019; does not apply to other fields of study)* | |
|---|---|
| **Code and number of effect of learning in accordance with standards of learning** *(in accordance with appendix to t Regulation of Minister of Science and Higher education from 26th July 2019)* | **Effects in time** |
| **Knowledge – Graduate* knows and understands:** | |
| G.K1 | |
| G.K2 | |
| **Skills– Graduate* is able to:** | |
| D.U18 | Communicate in basic and specialist Polish |

** In appendix to the Regulation of Minister of Science and Higher education from 26th of July 2019 „graduate", not student is mentioned.*

| **5.** **ADDITIONAL EFFECTS OF LEARNING** *(non-compulsory)* | |
|---|---|
| **Number of effect of learning** | **Effects of learning in time** |
| **Knowledge – Graduate knows and understands:** | |
| K1 | Basic anatomical terms (body parts and organs) |
| K2 | The names of general ailments, diseases and symptoms |
| **Skills– Graduate is able to:** | |
| S1 | take a patient's history at elementary Polish language level (personal history; chief complaint (pain): location, radiation, quality, quantity, duration, frequency, aggravating and relieving factors, associated symptoms; past history; family history; drug history; social history; the review of systems) |
| S2 | give simple instructions to an adult and paediatric patient during a physical examination and explain the doctor's intentions |
| **Social Competencies – Graduate is ready for:** | |
| SC1 | |
| SC2 | |

| **6. CLASSES** | | |
|---|---|---|
| **Form of class** | **Class contents** | **Effects of Learning** |
| C1/2 | *Class duration: 2 hours 15 minutes (winter term) and 1 hour 45 minutes (summer term) + 15-minute break*<br>Discussing the syllabus (the course content, learning outcomes and the methods of their verification; rules and regulations; credit receiving criteria)<br>The Polish verb – present/past tense revision. Basic question words – revision. Accussative and genitive case revision. | D.U.18<br>S1, S2<br>K1,K2 |
| C2/3 | Medical studies – subjects. Instrumental case – revision. | D.U.18<br>S1, S2<br>K1,K2 |
| C4/5 | Parts of the human body • The verb *boleć* (singular&plural/present&past tense). Ailments and minor health problems. | D.U.18<br>S1, S2<br>K1,K2 |
| C5/6 | Systems and organs • The cases of the noun and adjective in the singular&plural (revision) – forms and uses. The modals *móc* and *musieć* (present&past tense) | D.U.18<br>S1, S2<br>K1,K2 |
| C7/8 | The Dative case and the verbs followed by Dative. Distinction between imperfective & perfective verbs. | D.U.18<br>S1, S2<br>K1,K2 |
| C9/10 | The description of hospital stay. Basic verbs used to describe doctos' and nurses' activities – in past and present form. The verbs "chorować"and "leczyć". | D.U.18<br>S1, S2<br>K1,K2 |
| C11/12 | The elements of cinical examination. The hospital structure – parts of hospital. | D.U.18<br>S1, S2<br>K1,K2 |
| C13/14 | Giving directions. Prepositions "na", "po", "przy", "obok". Treatment room equipment. | D.U.18<br>S1, S2<br>K1,K2 |
| C15/16 | Names of medical specialists and specialties – word formation: nouns and adjectives. | D.U.18<br>S1, S2<br>K1,K2 |
| C17/18 | Basic ailments and body parts: revision. Types of medications: *lek/lekarstwo (na* e.g. *serce), tabletka, witamina, suplement diety, lek przeciwbólowy / przeciwgorączkowy / przeciwzapalny / hormonalny, tabletki antykoncepcyjne* • The verb *brać/wziąć* (singular/present&past tense) The imperfective & perfective verbs – revision. | D.U.18<br>S1, S2<br>K1,K2 |
| C 19/20 | Progress test. | D.U.18<br>S1, S2<br>K1,K2 |
| C21/22 | Instructions for the clinical examination of adults • Explaining the doctor's intentions to the patient • Future simple tense of selected verbs (e.g. *zbadać, osłuchać, zmierzyć, zrobić*) | D.U.18<br>S1, S2<br>K1,K2 |
| C 23/24 | Instructions for the clinical examination of children • Explaining the doctor's intentions to the patient • The imperative mood | D.U.18<br>S1, S2<br>K1,K2 |
| C 25/26 | Adverbs – formation, comparative and superlative forms. Locative case revision. | D.U.18<br>S1, S2<br>K1,K2 |

| | | |
|---|---|---|
| C 27/28 | The common cold and flu – a patient's description of the symptoms in the present/past tense • Time expressions (revision). Asking questions about patient's symptoms. Examples of basic history taking – dialogues. | D.U.18<br>S1, S2<br>K1,K2 |
| C 29/30 | History taking – questions about the most common symptoms and ailments. | D.U.18<br>S1, S2<br>K1,K2 |
| C 31/32 | Basic adjectives and verbs used to describe pain. | D.U.18<br>S1, S2<br>K1,K2 |
| C 33/34 | History taking: questions about chief complaint, personal medical history, social history, family history. | D.U.18<br>S1, S2<br>K1,K2 |
| C 35/36 | History taking :systemic inquiry (basic questions). Revision for the final test. | D.U.18<br>S1, S2<br>K1,K2 |
| C37/38 | Final written test. | D.U.18<br>S1, S2<br>K1,K2 |
| C39/40 | Final oral test. | D.U.18<br>S1, S2<br>K1,K2 |

## 7. LITERATURE

**Obligatory**

Obligatory literature: Maria Janowska, Świetlana Sikorska "Proszę oddychać! Część I Warszawski Uniwersytet Medyczny

**Supplementary**

Handouts prepared by the teachers

## 8. VERIFYING THE EFFECT OF LEARNING

| Code of the course effect of learning | Ways of verifying the effect of learning | Completion criterion |
|---|---|---|
| *e.g. G.K1, G.S1, K1* | *This field defines the methods used for grading students e.g. pop quiz, test, written report etc.* | *e.g. threshold number of points* |
| G.S18 | Written test. Oral test. | To successfully complete the II year Polish language course and obtain credit, a student is required to:<br>• attend all classes (min. 13 out of 15 in a semester)<br>A student who misses more than 2 classes per semester without a valid excuse will not be allowed to take the course tests and will not receive course credits.<br>Absences due to illness will be excused on presentation of a valid medical note within one week of return to study. In the case of two |

| | | |
|---|---|---|
| | | or more excused absences per semester the student must make up the missed classes. If a student misses a class, she/he must catch up on the missed material. It is the student's responsibility to communicate with the class teacher as soon as possible about any attendance issues.<br>• come to classes punctually<br>If a student arrives less than 15 minutes late three times per semester, it will count as one absence. Arriving to class more than 15 minutes late is counted as an absence.<br>• actively participate in each class<br>• complete all the assignments by the due date<br>• pass the progress test at the end of the winter semester and the course written and oral tests (covering the coursework of both the winter and summer semesters) at the end of the summer semester<br><br>A student who fails the course tests can take two resits.<br>The final course grade a student receives is the average (arithmetic mean) of the written and oral test grades (grades of 2-5), or a grade of 3 for passing a resit. A minimum score of 60% must be obtained on each (written and oral) test to pass the course.<br><br>A student who misses a scheduled test will receive a score of 0 unless she/he notifies the class teacher of the reason for her/his failure to take the test within three days of the scheduled test date and makes up the missed test if the reason is justified at the date set by the class teacher.<br><br>A student who fails the second resit needs to repeat the course.<br><br>Students who are 'independent users' of the Polish language (Level B2 as described in the Common European Framework) may be exempted from attending the second year Polish language course provided they achieve the required score on the B2 level examination administered by the University's Language Centre (Studium Języków Obcych) at the beginning of the academic year. Students interested in taking the exam should check with their class teacher for the exam date, time and location at the first class meeting.<br><br>The scale of grades is as follows:<br><br>2.0 (failed) Below 60%<br>3.0 (satisfactory) 60-69%<br>3.5 (rather good) 70-79%<br>4.0 (good) 80-85%<br>4.5 (more than good) 86-90%<br>5.0 (very good) 91-100% |
| | | |

**9. ADDITIONAL INFORMATION** *(information essential for the course instructor that are not included in the other part of the course syllabus e.g. if the course is related to scientific research, detailed description of, information about the Science Club)*

Rules and regulations of the Foreign Language Department https://sjo.wum.edu.pl/content/regulamin-sjo

# *IMMUNOLOGY*

| **1. IMPRINT** | |
|---|---|
| **Academic Year** | 2021/2022 |
| **Department** | Faculty of Medicine |
| **Field of study** | Medicine |
| **Main scientific discipline** *(in accord with appendix to the Regulation of Minister of Science and Higher education from 26th of July 2019)* | Medical science |
| **Study Profile** *(general academic / practical)* | General academic |
| **Level of studies** *(1st level /2nd level/ uniform MSc)* | Uniform MSc |
| **Form of studies** | Full time studies |
| **Type of module / course** *(obligatory / non-compulsory)* | Obligatory |
| **Form of verification of learning outcomes** *(exam / completion)* | **Exam** |
| **Educational Unit / Educational Units** *(and address / addresses of unit / units)* | **Department of Clinical Immunology**<br>Nowogrodzka 59 St, 02-006 Warsaw<br>Tel.: (+48 22) 502 14 72, 502 12 60<br>Faks: (+48 22) 502 21 59<br>E-mail:<br>Secretary: Ewa Rusinowicz <ewa.rusinowicz(at)uckwum.pl>,<br>Head: Dr hab. Radosław Zagożdżon <radoslaw.zagozdzon(at)wum.edu.pl> |

| | |
|---|---|
| | Didactic coordinator: Dr hab. Beata Kaleta <beata.kaleta(at)wum.edu.pl><br>https://zik.wum.edu.pl/ |
| **Head of Educational Unit / Heads of Educational Units** | Dr hab. n. med. Radosław Zagożdżon |
| **Course coordinator** *(title, First Name, Last Name, contact)* | Dr hab. n. med. i n. o zdr. Beata Kaleta |
| **Person responsible for syllabus** *(First name, Last Name and contact for the person to whom any objections concerning syllabus should be reported)* | Dr hab. n. med. i n. o zdr. Beata Kaleta |
| **Teachers** | Dr hab. n. med. Radosław Zagożdżon<br>Dr hab. n. med. i n. o zdr. Beata Kaleta<br>Dr hab. n. med. i n. o zdr. Anna Burdzińska<br>Dr n. med. Jan Borysowski<br>Dr n. med. Monika Kniotek<br>Mgr Piotr Wierzbicki<br>Mgr Aleksander Roszczyk<br>Mgr Katsieryna Marhelava |

## 2. BASIC INFORMATION

| | | | |
|---|---|---|---|
| **Year and semester of studies** | II year,4 semester | **Number of ECTS credits** | 3.00 |

| FORMS OF CLASSES | **Number of hours** | **ECTS credits calculation** |
|---|---|---|
| **Contacting hours with academic teacher** | | |
| Lecture (L) | 0 | |
| Seminar (S) | 40 | 3 |
| Discussions (D) | 0 | |
| e-learning (e-L) | 0 | |
| Practical classes (PC) | 0 | |
| Work placement (WP) | 0 | |
| **Unassisted student's work** | | |
| Preparation for classes and completions | 0 | 0 |

| **3.** **COURSE OBJECTIVES** | |
|---|---|
| O1 | Familiarization with basic immunology in reference to elements of clinical immunology |

| **4.** **STANDARDS OF LEARNING – DETAILED DESCRIPTION OF EFFECTS OF LEARNING** *(concerns fields of study regulated by the Regulation of Minister of Science and Higher Education from 26 of July 2019; does not apply to other fields of study)* | |
|---|---|
| **Code and number of effect of learning in accordance with standards of learning** *(in accordance with appendix to the Regulation of Minister of Science and Higher education from 26th of July 2019)* | **Effects in time** |
| **Knowledge – Graduate* knows and understands:** | |
| G.K1 | The graduate knows and understands basics of development and mechanisms of immune system activity, including specific and non-specific mechanisms of humoral and cellular immunity (C.W21) |
| G.K2 | The graduate knows and understands major histocompatibility complex (C.W.22) |
| G.K3 | The graduate knows and understands types of hypersensitivity reactions, types of immunodeficiency and basics of immunomodulation (C.W23) |
| G.K4 | The graduate knows and understands issues in the field of tumor immunology (C.W24) |
| G.K5 | The graduate knows and understands causes, symptoms, principles of diagnosis and therapeutic management in relation to the most common internal diseases occurring in adults and their complications: 8) allergic diseases, including anaphylaxis, anaphylactic shock and angioedema (E.W7) |
| **Skills– Graduate* is able to:** | |
| G.S1 | The graduate is able to use the antigen-antibody reaction in current modifications and techniques for the diagnosis of infectious, allergic, autoimmune and neoplastic diseases and blood diseases (C.U8) |
| G.S2 | The graduate is able to associate the f tissue and organ damage with clinical signs, history and results of laboratory tests (C.U11) |

** In appendix to the Regulation of Minister of Science and Higher education from 26th of July 2019 „graduate", not student is mentioned.*

| **5.** **ADDITIONAL EFFECTS OF LEARNING** *(non-compulsory)* | |
|---|---|
| **Number of effect of learning** | **Effects of learning i time** |
| **Knowledge – Graduate knows and understands:** | |
| K1 | - |
| K2 | - |

| Skills– Graduate is able to: | |
|---|---|
| S1 | - |
| S2 | - |
| **Social Competencies – Graduate is ready for:** | |
| SC1 | - |
| SC2 | - |

## 6. CLASSES

| Form of class | Class contents | Effects of Learning |
|---|---|---|
| Seminars | S1- Introduction to the immune system<br>S2 - Cells and tissues of the immune system<br>S3 - Circulation and migration of leukocytes<br>S4 – Innate immunity and natural killer cells<br>S5 – Recognition of antigens by antibodies<br>S6 – Presentation of antigens to T lymphocytes by major histocompatibility complex molecules<br>S7 – Cytokines and signaling via immune receptors<br>S8 – Development of lymphocytes and antigen receptor gene rearrangement<br>S9 - Activation of T lymphocytes<br>S10 – Differentiation and functions of effector T Cells<br>S11 – Activation of B lymphocytes and antibody production<br>S12 – Effector mechanisms of humoral immunity<br>S13 – Specialized immunity at epithelial barriers and immune privileged tissues<br>S14 - Immunity to Microbes<br>S15 – Hypersensitivity disorders and allergy<br>S16 – Immunologic tolerance and autoimmunity<br>S17 – Immunity to tumors<br>S18 – Transplantation immunology<br>S19 – Acquired immunodeficiencies<br>S20 – Congenital immunodeficiencies | C.W21<br>C.W22<br>C.W23<br>C.W24<br>C.U8<br>C.U11<br>E.W7 8) |

## 7. LITERATURE

**Obligatory**

„Cellular and Molecular Immunology" (8th or 9th edition) (Cellular and Molecular Immunology, Abbas)

**Supplementary**

Riot,s Essential Immunology" (13th edition) by Peter J. Delves, Seamus J. Martin, Dennis R. Burton, Ivan M Riott

**8. VERIFYING THE EFFECT OF LEARNING**

| Code of the course effect of learning | Ways of verifying the effect of learning | Completion criterion |
|---|---|---|
| *e.g. G.K1, G.S1, K1* | *This field defines the methods used for grading students e.g. pop quiz, test, written report etc.* | *e.g. threshold number of points* |
| G.K1-G.K5<br>G.S1-G.S2 | Exam – single choice test (50 questions)<br>Correction exam - single choice test (50 questions)<br><br>Commission exam – oral exam (3-5 descriptive questions) | CRITERIA:<br>• 2.0 (failed): 0-25 (out of 50) positive answers on MCQ and maximum two inexcusable absences on seminars<br>• 3.0 (satisfactory): 26 – 33 (out of 50) positive answers on MCQ and maximum two inexcusable absences on seminars<br>• 3.5 (rather good): 34– 36 (out of 50) positive answers on MCQ and maximum two inexcusable absences on seminars<br>• 4.0 (good): 37 – 39 (out of 50) positive answers on MCQ and maximum two inexcusable absences on seminars<br>• 4.5 (more than good): 40 – 42 (out of 50) positive answers on MCQ and maximum two inexcusable absences on seminars<br>• 5.0 (very good): 43 – 50 (out of 50) positive answers on MCQ and maximum two inexcusable absences on seminars |

**9. ADDITIONAL INFORMATION** *(information essential for the course instructor that are not included in the other part of the course syllabus e.g. if the course is related to scientific research, detailed description of, information about the Science Club)*

Three or more not excused absence must be made up with the teacher responsible for the topic (an oral answer to some questions from seminar).
If the student has more than 2 absences, he will not be admitted to the exam.