Cells and molecules in a snapshot - an overview of contemporary experimental medicine techniques

1. IMPRINT

Academic Year	2025/2026
Department	Faculty of Medicine
Field of study	Medicine
Main scientific discipline	Medical sciences
Study Profile	General academic
Level of studies	Uniform MSc
Form of studies	Full-time studies
Type of module / course	Non-compulsory
Form of verification of learning outcomes	Completion
Educational Unit / Educational Units	Department of Biophysics, Physiology and Pathophysiology Faculty of Health Sciences Medical University of Warsaw 5 Chałubińskiego Street (4th floor) 02-004 Warsaw Phone no.: +48 22 628 78 46
Head of Educational Unit / Heads of Educational Units	Professor Dariusz Szukiewicz, PhD
Course coordinator	Assistant Professor Anna Henriques de Sepulveda, PhD anna.sepulveda@wum.edu.pl
Person responsible for syllabus	Assistant Professor Anna Henriques de Sepulveda, PhD anna.sepulveda@wum.edu.pl
Teachers	Professor Dariusz Szukiewicz, PhD Assistant Professor Anna Henriques de Sepulveda, PhD

2. BASIC INFORMATION

Year and semester of studies	III-Vth year, winter or summer semester	**Number of ECTS credits**	2.00

FORMS OF CLASSES **Contacting hours with academic teacher**	**Number of hours**	**ECTS credits calculation**
Lecture (L)		
Seminar (S)	30 (24h e-learning, 6h on campus)	1.20
Classes (C)		
e-learning (e-L)		
Practical classes (PC)		
Work placement (WP)		
Unassisted student's work		
Preparation for classes and completions	20	0.80

3. COURSE OBJECTIVES

O1	Presentation of current knowledge on the methodology of research applied in experimental medicine, with particular emphasis on molecular, cellular and serological techniques, as well as imaging methods in diagnostics and therapy.
O2	Professional preparation for work aimed at understanding the essence, significance and limitations of scientific and diagnostic research, related to continuous education in the field of modern methods used in medicine.

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

Code and number of the effect of learning in accordance with standards of learning	**Effects in the field of:** *(in accordance with appendix to the Regulation of Minister of Science and Higher education from 26th of July 2019)*
Knowledge – Graduate* knows and understands:	
B.W29	how to perform scientific, observational and experimental research, as well as in vitro tests the purpose of which is the development of medicine
Skills– Graduate* is able to:	
B.U13	plan simple research and interpret the results and draw conclusions
B.U8	use the basic laboratory techniques, such as qualitative analysis, titration, colorimetric analysis, pH-metry, chromatography, electrophoresis of proteins and nucleic acids.

** 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 in the fields of:
Knowledge – Graduate knows and understands:	
K1	Objectives and principles of conducting scientific research
K2	Methods of data analysis in the field of experimental medicine
K3	Basic cell and animal models and their application
K4	Basic techniques of real and virtual microscopy
K5	Morphometric methods
K6	Methods of staining and labeling of cells and tissues
K7	Genetic methods and their application in diagnostics, drug efficacy tests and therapies
K8	Serological methods and their application in diagnostics and basic research
Skills– Graduate is able to:	
S1	Plan and conduct quantitative research using the presented research tools
S2	Critically analyze own and published research results
Social Competencies – Graduate is ready for:	
SC1	Accurate and reliable interpretation of the knowledge provided in the field of modern methods used in experimental medicine and systematic enrichment of knowledge and skills in this field
SC2	Independent and team solving of experimental problems, expressing opinions on the determinants of human diseases and diseases

6. CLASSES

Form of class	Class contents	Effects of Learning
e-learning (e-L)	e-L1. Introduction to experimental medicine. Subject, purpose and principles of conducting scientific research. e-L2. Analysis of experimental data in experimental medicine. Ethics in scientific research. e-L3. Review of cell and animal models and their application. e-L4. Real and virtual microscopy. Light versus electron microscopy and transmission versus scanning microscopy. e-L5. Morphometric analyses in histology and basic research. e-L6. Methods of staining and marking cells and tissues. Immunocytochemistry. Immunohistochemistry. Autoradiography and radioimmunology. e-L7. Genetic methods in diagnostics, drug efficacy tests and therapy. Sequencing, RT-PCR, nested PCR. e-L8. Serological methods in diagnostics and basic research. ELISA. Western-blot.	**B.W29, B.U13, K1, S1, S2, SC1, SC2** **B.W29, B.U13, B.U8, K2, S1, S2, SC1** **B.W29, B.U13, B.U8, K3, S1, S2, SC1** **B.W29, B.U13, B.U8, K4, S1, S2, SC1** **B.W29, B.U13, B.U8, K5, S1, S2, SC1** **B.W29, B.U13, B.U8, K6, S1, S2, SC1** **B.W29, B.U13, B.U8, K7, S1, S2, SC1** **B.W29, B.U13, B.U8, K8, S1, S2, SC1**
Practical classes (PC)	PC1. Conducting cell cultures, optimization of cell models currently used in scientific research.	**B.U8, K3, S1**

	PC2. Performing serological assays in current scientific research.	**B.U8, K8, S1, S2**

7. LITERATURE

Obligatory

Joseph Sambrook, David W. Russell. Molecular Cloning: A Laboratory Manual (4th Edition). Cold Spring Harbor Laboratory Press 2012
Lizabeth A. Allison. Fundamental Molecular Biology, 3rd edition. John Wiley and Sons Ltd 2021.

Supplementary

Terence A. Brown. Genomes.1999

8. VERIFYING THE EFFECT OF LEARNING

Code of the course effect of learning	Ways of verifying the effect of learning	Completion criterion
B.W29, B.U13, K1-K8, SC1, SC2	Preparing a short study/presentation on a selected topic from the course	Illustrating a selected issue in a clear and interesting way

9. ADDITIONAL INFORMATION

Classes are scheduled for the winter (or summer) semester in a hybrid mode (24h - e-learning, 6h - classes), starting from November 2024. The seminar materials will be available on the e-learning platform. The last 2 classes will be held in the form of practical classes (exercises) in contact mode. The dates of practical classes will be scheduled after closing of the groups. For organizational reasons, the limit of people in practical classes in a group is 20.
Contact for student issues: Assistant Professor Anna Henriques de Sepulveda, PhD: anna.sepulveda@wum.edu.pl

ATTENTION

The final 10 minutes of the last class of the block/semester/year should be allotted for students to fill out the Survey of Evaluation of Classes and Academic Teachers