

## Medicine in "OMICS"

### Educational subject description sheet

#### Basic information

<p><b>Organizational unit</b> Faculty of Medicine</p> <p><b>Field of study</b> Medicine, Program in English</p> <p><b>Study level</b> long-cycle master's degree program</p> <p><b>Study form</b> full-time</p> <p><b>Education profile</b> general academic</p> <p><b>Disciplines</b> Medical science</p> <p><b>Subject related to scientific research</b> Tak</p> <p><b>USOS code</b> <a href="#">LE.LEE.JS.3f0730</a></p>		<p><b>Didactic cycle</b> 2022/23</p> <p><b>Realization year</b> 2024/25</p> <p><b>Lecture languages</b> english</p> <p><b>Block</b> obligatory for passing in the course of studies</p> <p><b>Mandatory</b> elective</p> <p><b>Examination</b> graded credit</p> <p><b>Standard group</b> C. Preclinical course</p>	
<b>Subject coordinator</b>	Monika Piwowar		
<b>Lecturer</b>	The full list of lecturers is available on the website <a href="http://usosweb.uj.edu.pl">usosweb.uj.edu.pl</a> in the tab Directory → Courses.		
<b>Periods</b> Semester 5, Semester 6	<b>Examination</b> graded credit	<b>Activities and hours</b> seminar: 15 classes: 15	<b>Number of ECTS points</b> 2.0

## Goals

C1	Acquiring knowledge and skills on issues related to personalized medicine in terms of OMICs.
C2	Developing awareness of science development, the availability of methods and tools in the field of personalized medicine
C3	General development of mental fitness, cognitive ability with particular emphasis on critical thinking
C4	Implementation for self-study and independent work through project classes and papers

## Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
<b>Knowledge - Student knows and understands:</b>			
W1	methods of diagnostic and therapeutic procedures appropriate for specific disease states	O.W3	project
W2	methods of conducting scientific research	O.W5	project
W3	indications for genetic tests performed with the aim of individualizing pharmacotherapy	C.W41	project
W4	the main mechanisms of drug action, and their changes in the system depending on age	C.W36	project
W5	genetic mechanisms for the acquisition of drug resistance by microorganisms and cancer cells	C.W11	project
W6	basics of diagnostics of gene and chromosomal mutations responsible for hereditary and acquired diseases, including neoplastic diseases	C.W9	project
W7	factors influencing the primary and secondary genetic balance of the population	C.W8	project
W8	basic concepts in the field of genetics	C.W1	project
W9	development, structure and functions of the human body in normal and pathological conditions	O.W1	project
<b>Skills - Student can:</b>			
U1	plan the diagnostic procedure and interpret its results	O.U3	classroom observation
U2	inspire the learning process of others	O.U6	classroom observation
U3	communicate and share knowledge with colleagues in a team	O.U8	classroom observation
U4	critically evaluate the results of scientific research and adequately justify the position	O.U9	classroom observation
U5	estimate the risk of a given disease becoming apparent in the offspring based on family predisposition and the influence of environmental factors	C.U5	classroom observation
U6	describe the changes in function of the organism in homeostasis disorder, determine its integrated reaction to physical effort, high and low temperature, blood or water loss, sudden verticalization, transition from sleep to wakefulness	C.U20	classroom observation

Code	Outcomes in terms of	Effects	Examination methods
<b>Social competences - Student is ready to:</b>			
K1	perceive and recognize own limitations and self-assessing educational deficits and needs	O.K5	classroom observation
K2	use objective sources of information	O.K7	classroom observation
K3	formulate conclusions from own measurements or observations	O.K8	classroom observation

### Calculation of ECTS points

Activity form	Activity hours*
seminar	15
classes	15
preparation of multimedia presentation	5
preparation of a report	12
preparation of a project	13
<b>Student workload</b>	<b>Hours</b> 60
<b>Workload involving teacher</b>	<b>Hours</b> 30
<b>Practical workload</b>	<b>Hours</b> 15

\* hour means 45 minutes

### Study content

No.	Course content	Subject's learning outcomes	Activities
1.	Introduction to the course	W1, W2, U2, U3	seminar
2.	Genomics and transcriptomics	W2, W3, U2, U3, U4	seminar
3.	Metabolomics	W2, W4, U2, U3, U4	seminar
4.	Epigenomics	W2, W3, W7, W9, U4, U5, U6	seminar
5.	Biological networks	W2, W9, K1, K2, K3	seminar
6.	Functional and structural analysis of the human genome	W5, W6, W7, W8, U1, U2, U3, K2, K3	classes
7.	Genomics of individual differences in the human population (genetic profiles)	W3, W7, W8, W9, U1, U2, U3, U4, U5, K1, K2, K3	classes
8.	Determining differences in the activity of human genes in pathological conditions	W1, W3, W4, W7, U1, U2, U3, U4, U5, K2, K3	classes
9.	Examples of analysis of the human metabolome	W2, U1, U5, K1, K2, K3	classes
10.	Examples of human epigenome analysis	W1, W2, U1, U5, K2, K3	classes

No.	Course content	Subject's learning outcomes	Activities
11.	Integration of "OMICs" data	W2, U1, K2, K3	classes
12.	Individual project - 1	W2, U1, K2, K3	classes
13.	Individual project - 2	U4, K1, K2, K3	classes
14.	Presentation of the projects -1	U4, K1, K2, K3	classes
15.	Presentation of the projects -2	W2, U2, K1, K3	classes

## Course advanced

### Teaching methods:

case study, computer classes, classes in simulated conditions, demonstration, discussion, e-learning, project method, group work, seminar, simulation, workshop, practical classes

Activities	Examination methods	Credit conditions
seminar	project	Positive evaluation of the presentation
classes	classroom observation, project	Positive completing all practical and theoretical tasks and presentation of the final project.

### Additional info

The student has to do a list of tasks recommended by the teacher for each class. It will be a condition for passing classes. The list of completed tasks will be attached to the e-learning platform in the form of a report after each exercise. In addition, the student will have to prepare the presentation and conduct a short discussion. The speech should last about 20 minutes. The topic will be implemented alone or in teams of two. The course participant will choose an issue from the list of topics proposed by the teacher. The paper should take into account the literature suggested by the teacher. However, it is expected that the topic will be expanded to include information from independent research into available scientific literature.

The assessment will cover:

- degree of understanding of the developed topic
- diligence in preparing the presentation of the paper
- proper selection of source materials from reliable scientific sources
- ability to interest seminar participants in a selected topic
- ability to conduct discussion after a paper

## Entry requirements

Completed biochemistry course

## Literature

### Obligatory

1. A set of publications will be made available to students gradually during classes.
2. Ponadto w ramach zajęć studenci będą korzystali z następujących repozytoriów: <https://reactome.org/> <https://www.genome.jp/kegg/> <https://www.ebi.ac.uk/> <https://www.ncbi.nlm.nih.gov/>

## Kierunkowe efekty uczenia się

Kod	Treść
O.K5	perceive and identify one's own limitations and perform self-assessment of deficits and educational needs
O.K7	use impartial sources of information
O.K8	draw conclusions from own measurements or observations
O.U3	plan diagnostics and interpret its results
O.U6	inspire the learning process of others
O.U8	communicate with colleagues in the team and share knowledge
O.U9	critically evaluate scientific findings and properly substantiate
O.W1	development, structure and functions of the human body in normal and pathological conditions
O.W3	ways of diagnostics and therapy appropriate for particular diseases
O.W5	methods of conducting scientific research
C.U5	estimate the risk of a given disease manifesting in one's children, based on family predisposition and environmental factors
C.U20	describe changes in body functioning at the time of homeostasis imbalance, in particular determine its integrated response to physical exertion, exposure to high and low temperature, blood or water loss, sudden verticalisation, transition from sleeping to being awake
C.W1	elementary concepts in genetics
C.W8	factors affecting the primary and secondary gene balance in the population
C.W9	fundamentals of diagnosing gene and chromosome mutations accounting for hereditary and acquired diseases, including neoplasms
C.W11	genetic mechanisms of microorganisms and cancer cells drug resistance
C.W36	main mechanisms of drugs operation and their age-dependent transformations in the body
C.W41	indications for genetic testing carried out to individualise pharmacotherapy