Digital Medicine

Educational subject description sheet

Basic information

Organizational unit Faculty of Medicine	**Didactic cycle** 2025/26
Field of study Medicine, Program in English	**Realization year** 2026/27
Study level long-cycle master's degree program	**Lecture languages** english
Study form full-time	**Block** obligatory for passing in the course of studies
Education profile general academic	**Mandatory** obligatory
Disciplines Medical science	**Examination** graded credit
ISCED classification 0912 Medicine	**Standard group** B. SCIENTIFIC BASIS OF MEDICINE
Subject related to scientific research Tak	
USOS code LE.LEE.JS.2o2539	

Subject coordinator	Wojciech Lasoń
Lecturer	The full list of lecturers is available on the website usosweb.uj.edu.pl in the tab Directory → Courses.

Period Semester 4	**Examination** graded credit **Activities and hours** computer classes: 30	**Number of ECTS points** 3.0

Entry requirements and additional information

Entry requirements

- basic computer skills

- obligatory attendance at classes

Goals

C1	providing knowledge on the use of new ICT technologies used in medical practice
C2	acquiring skills in using computer programs and systems used in modern medicine
C3	getting acquainted with tools supporting computer education

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	basic computer and biostatistical tools used in medicine	B.W23	theoretical colloquiums, assignment report
W2	possibilities of modern telemedicine as a tool to support the work of the physician	B.W25	theoretical colloquiums, assignment report
Skills – Student can:			
U1	use medical databases and properly interpret the information included in them, needed to solve problems in basic and clinical sciences	B.U8	classroom observation, project, assignment report
Social competences – Student is ready to:			
K1	use objective sources of information	O.K7	classroom observation, project, assignment report
K2	formulate conclusions from one’s own measurements or observations	O.K8	classroom observation, project, assignment report

Calculation of ECTS points

Activity form	Activity hours*
computer classes	30
preparation for classes	15
preparation of a report	15
preparation for colloquium	5
tutorial	5
preparation of a project	5
Student workload	**Hours** 75

Workload involving teacher	**Hours** 30
Practical workload	**Hours** 30

* hour means 45 minutes

Study content

No.	Course content	Subject's learning outcomes	Activities
1.	Artificial intelligence in medicine. Basics of machine learning. Large language models in medicine. Digital decision support systems	W1, U1, K1, K2	computer classes
2.	Computer tools to support medical education and continuing education. Online medical knowledge resources. Virtual patient.	W1, U1, K1, K2	computer classes
3.	Algorithmic and computational thinking. Workflow systems in medicine. Clinical pathways.	W1, K1	computer classes
4.	Bioinformatics. Molecular simulations. IT tools for -omics. Personalized medicine.	W1, U1, K1	computer classes
5.	Biomedical signal processing. Medical and surgical robots. Remote control, biosensors. Internet of Things, wearable devices	W1, U1, K2	computer classes
6.	Medical teleconsultations. Medical data exchange (DICOM, HL7 standards).	W2, K1, K2	computer classes
7.	3D technologies in medicine, 3D printing. Digital medical imaging. Segmentation of medical source data. Immersive technologies in medicine: virtual, augmented and mixed reality.	W1, U1, K1	computer classes
8.	The concept of E-health. Health applications for mobile devices. Digital markers and therapeutics. Software as a medical device. Basics of cybersecurity.	W1, W2, U1, K2	computer classes
9.	Computer simulation modeling. Processing, analysis and interpretation of medical data.	W1, K2	computer classes

Course advanced

Teaching methods:

case study, computer classes, classes in simulated conditions, discussion, e-learning, educational film, case study method, group work, computer room, assignments solving, low fidelity simulation, virtual patient, PBL Problem Based Learning

Activities	Examination methods	Credit conditions
computer classes	theoretical colloquiums, classroom observation, project, assignment report	Detailed information in "Additional description" below

Additional info

All classes are mandatory, and any absence must be formally excused. In the event of an absence, students are required to contact the course coordinator for information on how to make up missed classes. Joining another laboratory group is the preferred option, but if this is not possible, the missed topic will be made up remotely. Students will be required to familiarize themselves with the materials posted on the distance learning platform, complete the exercises, and prepare and submit a report within the scope agreed upon with the course coordinator.
To get the credit (positive grade) students need to:
1. attend all classes (in case of documented reason of absence you need to catch up on studied subject)
2. prepare a clinical pathway project
3. pass EACH TOPIC by:

- active participation in exercises
- perform certain tasks
- prepare and submit the report

3. pass the Final Test (up to 100 pts)
4. collect at least 61 of 100 pts.
Students who do not collect 61 pts are obliged to retake the Final Test. Then number of points from the course is counted as 61 pts.
Grading scale:

points	grade
0 - 60:	2.0
61 - 68:	3.0
69 - 76:	3.5
77 - 84:	4.0
85 - 92:	4.5
93 - 100:	5.0

Literature

Obligatory

1. Materials made available in the course on the distance learning platform pegaz

Optional

1. Health Informatics. An Interprofessional Approach, Hardy L. R. 3rd Ed. Elsevier Inc. (2024)
2. Simulation in medicine – Computer-aided diagnostics and therapy. Irena Roterman-Konieczna (Ed.). De Gruyter. ISBN 978-3-11-066687-8 (2020)
3. Simulation in medicine – Preclinical and clinical applications. Irena Roterman-Konieczna (Ed.). De Gruyter. ISBN 978-3-11-040626-9 (2015)
4. Clinical Decision Support and Beyond: Progress and Opportunities in Knowledge-Enhanced Health and Healthcare. Del Fiol G, Greenes RA. 3rd ed. United States: Elsevier Science (2023)
5. AI Revolution in Medicine. Lee P. GPT-4 and Beyond. Pearson Education, Inc. (2023)
6. Biomedical Informatics: Computer Applications in Health Care and Biomedicine. Shortliffe EH, Cimino JJ, Chiang MF. 5th ed. Switzerland: Springer International Publishing (2021)
7. Artificial Intelligence in Undergraduate Medical Education: A Scoping Review. Acad Med. Lee J, Wu AS, Li D, Kulasegaram KM. Nov 1;96(11S):S62-S70, (2021)
8. Telemedicine Technologies: Information Technologies in Medicine and Digital Health. Fong B., Fong A.C.M, Li C.K. 2nd Ed. Wiley. ISBN 978-1-119-57574-0 (2020)

Rules for using AI tools

In the "Digital Medicine" course, the use of artificial intelligence (AI) tools, including generative systems based on large language models, is generally limited and may only occur in situations expressly specified by the teacher. These tools may only be used as part of didactic classes, for which the teacher consents, as part of exercises or analysis of digital medicine technologies.
In other cases, term papers, projects, and other forms of student activity should be prepared independently. In particular, it is prohibited to present content generated by AI systems as one's own intellectual work, use AI tools to prepare all or a

significant portion of term papers without the teacher's express consent, generate automated answers to exam or test questions, or use such tools during tests, exams, or other forms of knowledge assessment without express permission. Entering any sensitive data into AI systems, especially patient data, clinical data, or information covered by medical confidentiality, is also prohibited. Such actions may be considered a violation of academic integrity.
In cases where the teacher permits the use of AI tools, the student must clearly and transparently indicate their use. The thesis should include the name of the tool used, as well as its scope of application, such as analysis, generating initial text proposals, or proofreading. This information should be included in the appropriate section of the thesis (e.g., in the methodology, footnote, or section on tools used).
It is important to emphasize that artificial intelligence systems can generate information that is unverified, outdated, or scientifically incorrect. Therefore, any content obtained using them requires critical evaluation and verification with credible scientific sources. Ultimate responsibility for the substantive accuracy, scientific credibility, and interpretation of the information presented in the student's assignment/report/presentation rests with the student. Using artificial intelligence tools in any form of assessment without the teacher's consent/instructions will result in immediate failure of the assessment.

Effects

Code	Content
O.K7	The graduate is ready to use objective sources of information
O.K8	The graduate is ready to formulate conclusions from one’s own measurements or observations
B.U8	The graduate can use medical databases and properly interpret the information included in them, needed to solve problems in basic and clinical sciences
B.W23	The graduate knows and understands basic computer and biostatistical tools used in medicine
B.W25	The graduate knows and understands possibilities of modern telemedicine as a tool to support the work of the physician