JAGIELLONIAN UNIVERSITY MEDICAL COLLEGE

Computer science and medical statistics

Educational subject description sheet

Basic information

Organizational unit Faculty of Medicine	**Didactic cycle** 2023/24
Field of study Dentistry, Program in English	**Realization year** 2023/24, 2025/26
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
Subject related to scientific research Tak	**Standard group** C. PRECLINICAL SCIENCES
USOS code LE.LDE.JS.1o0178	

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 1	**Examination** credit **Activities and hours** classes: 20	**Number of ECTS points** 1.0

Period Semester 5	**Examination** graded credit **Activities and hours** classes: 25	**Number of ECTS points** 1.0

Goals

C1	Introduce students with modern and innovative information systems and applications used in medicine, especially in dentistry.
C2	Demonstrate methods and tools and develop skills to used efficiently in supporting decision and therapeutic processes
C3	Getting acquainted with e-learning tools in teaching dentistry

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	issues in the field of medicine and natural sciences – in the basic scope	O.W1	multiple choice test
W2	the rules of conducting scientific research and spreading their results	O.W4	assignment report, multiple choice test
Skills – Student can:			
U1	plan own learning activities and constantly learn in order to update own knowledge	O.U5	multiple choice test
U2	critically evaluate the results of scientific research and adequately justify the position	O.U9	project
Social competences – Student is ready to:			
K1	use objective sources of information	O.K7	assignment report
K2	formulate conclusions from own measurements or observations	O.K8	assignment report

Calculation of ECTS points

Semester 1

Activity form	Activity hours*
classes	20
preparation for classes	15

Student workload	**Hours** 35
Workload involving teacher	**Hours** 20
Practical workload	**Hours** 20

* hour means 45 minutes

Semester 5

Activity form	Activity hours*
classes	25

Student workload	**Hours** 25
Workload involving teacher	**Hours** 25
Practical workload	**Hours** 25

* hour means 45 minutes

Study content

No.	Course content	Subject's learning outcomes	Activities
1.	Medical databases. Searching for information in medical databases. Data processing	W2, U2, K1, K2	classes
2.	3D technologies in medicine. Immersive technologies and 3D printing.	W1, U1, K1	classes
3.	The use of e-learning methods in medical education. Benefits of using e-learning in various scenarios in order to improve the quality of education in medicine. Practice learning in a virtual patient environment.	W1, U1, K1	classes
4.	Modeling and simulation in medicine. Performing experiments on computer models.	W1, U1	classes
5.	Medical 2D and 3D image processing. Using representative medical image viewers supporting the DICOM standard. Reconstruction of 3D models, performing 3D segmentation.	W1, U1, U2, K1	classes
6.	Clinical Decision Support Systems (CDSS) – improving the quality of decision in medicine. Motivation behind CDSS and basic components. Decision trees, machine learning, probabilistic models. Artificial intelligence in decision support systems.	U1, K1	classes
7.	Issues of modern telemedicine. An approach to support the doctor's work, using remote access technologies. Simulation of remote consunting sessions.	W1, U1, K1	classes
8.	Clinical pathway. Implementation of your own project regarding the clinical pathway. Discussion in group forum on the presented approach.	W1, U2, K2	classes
9.	Biostatistics. - types of variables, descriptive statistics, hypothesis testing, normal distribution - linear correlation, simple linear regression - independent two-samples t test, paired t test, one-sample t test - ANOVA, chi-square analysis in contingency table	W1, W2, U2, K2	classes

Course advanced

Semester 1

Teaching methods:

case study, classes / practicals, computer classes, laboratories (labs), demonstration, discussion, e-learning, project method, case study method, presentation, group work, seminar, virtual patient, lecture with multimedia presentation

Activities	Examination methods	Credit conditions
classes	project, assignment report, multiple choice test	Detailed information in "Additional description" below

Semester 5

Teaching methods:

computer classes, laboratories (labs), discussion, e-learning, problem solving method, project method, presentation, group work, simulation, low fidelity simulation, PBL Problem Based Learning

Activities	Examination methods	Credit conditions
classes	project, assignment report, multiple choice test	Detailed information in "Additional description" below

Additional info

All classes are mandatory and absence must be excused (documented reason of absence). In case of absence students need to catch up on missed topic.
Semester 1
To get the credit 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 and perform certain tasks
   prepare and submit the report
4. prepare presentation on selected topic (up to 10 pts)
5. pass Medical Informatics Test (up to 30 pts)
6. collect at least 20 of 40 pts

Students who do not collect 20 pts are obliged to retake Medical Informatics Test. Then number of points from the course will be counted as 20.
Points obtained during the course Computer Science and Medical Statistics 1/2 (semester 1) will be added in future to the points obtained during the course Computer Science and Medical Statistics 2/2 (semester 5). The final grade on semester 5 will be taken from the sum of this points.
Semester 5
To get the 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. pass EACH TOPIC by:
   active participation in exercises and perform certain tasks
   prepare and submit the report
3. pass Medical Informatics (up to 20 pts)
4. prepare and pass Biostatistics Project (up to 40 pts)
5. collect at least 30 of 60 pts

Students who do not collect 30 pts are obliged to retake the Biostatistics Project and Medical Informatics Test. Then number

of points from the course will be counted as 30 pts
Points obtained during the course Computer Science and Medical Statistics 2/2 (semester 5) will be added to the points obtained in past during the course Computer Science and Medical Statistics 1/2 (semester 1). The final grade will be taken from the sum of this points. To get positive grade students need to collect at least 50 pts of 100 together (50% of all points).
Final Grading Scale:

points	grade
0 - 49:	2.0
50 - 60:	3.0
61 - 70:	3.5
71 - 80:	4.0
81 - 90:	4.5
91 - 100:	5.0

Entry requirements

- participation in classes is mandatory
- no prerequisites for participation in classes

Literature

Obligatory

1. Health Informatics. An Interprofessional Approach, 3rd Ed. Elsevier Inc. 2024
2. Simulation in medicine – Computer-aided diagnostics and therapy. Irena Roterman-Konieczna (Ed.) 2020. De Gruyter. ISBN 978-3-11-066687-8
3. Statistics by Prescription. Irena Roterman-Konieczna. 2009. Jagiellonian University Press. ISBN 978-83-233-2741-7

Optional

1. AI Revolution in Medicine. GP-T and Beyond. Pearson Education, Inc. 2023
2. Del Fiol G, Greenes RA. Clinical Decision Support and Beyond: Progress and Opportunities in Knowledge-Enhanced Health and Healthcare. (2023). 3rd ed. United States: Elsevier Science.
3. Shortliffe EH, Cimino JJ, Chiang MF. Biomedical Informatics: Computer Applications in Health Care and Biomedicine. (2021). 5th ed. Switzerland: Springer International Publishing.
4. Lee J, Wu AS, Li D, Kulasegaram KM. Artificial Intelligence in Undergraduate Medical Education: A Scoping Review. Acad Med. 2021 Nov 1;96(11S):S62-S70.
5. Simulation in Medicine – Preclinical and Clinical Applications. Irena Roterman-Konieczna (Ed.) 2015. De Gruyter. ISBN 978-3-11-040626-9
6. Trowbridge RL, Rencic JJ, Durning SJ. Teaching Clinical Reasoning. (2015). United States: American College of Physicians.

Kierunkowe efekty uczenia się

Kod	Treść
O.K7	use impartial sources of information
O.K8	draw conclusions from own measurements or observations
O.U5	plan one’s own educational activity and continuously improve oneself in order to update knowledge
O.U9	critically evaluate scientific findings and properly substantiate
O.W1	issues in the field of medicine and life sciences to a basic extent
O.W4	principles of scientific research and dissemination of the results