Telemedicine with Elements of Medical Simulation

Educational subject description sheet

Basic information

Organizational unit Faculty of Medicine	**Didactic cycle** 2023/24
Field of study Medicine, Program in English	**Realization year** 2024/25
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** B. Scientific basics of medicine
USOS code LE.LEE.JS.2o1587	

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** classes: 30	**Number of ECTS points** 2.0

Goals

C1	acquiring knowledge regarding the use of new information and communication technologies (ICT) used in patient diagnostics and therapy
C2	acquiring skills in using computer programs and systems used in modern medicine
C3	getting acquainted with e-learning tools in teaching medicine

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	basic IT and biostatistical tools used in medicine, including medical databases, spreadsheets and computer graphics basics	B.W26	multiple choice test
W2	the possibilities of modern telemedicine as a tool to support the work of a doctor	B.W28	multiple choice test
W3	on-line data presentation techniques	B.W36	assignment report, multiple choice test
W4	computer-aided decision support for medical decisions with particular emphasis on clinical pathway techniques	B.W39	project, multiple choice test
W5	basic techniques of representation of medical knowledge for intelligent computer systems in medicine	B.W40	multiple choice test
W6	elements of the hospital patient service system	B.W42	assignment report, multiple choice test
W7	selected online sources of medical information, with particular emphasis on genetic diseases, available on the Internet	B.W43	assignment report, multiple choice test
W8	principles of operation and organisation of teleconferences	B.W44	multiple choice test
W9	types of IT tools supporting the process of remote lifelong learning with particular emphasis on simulators available on-line	B.W45	assignment report, multiple choice test
W10	the types of data used in electronic medical records	B.W47	multiple choice test
W11	principles for the operation and use of electronic patient records	B.W49	multiple choice test
W12	the means of secure Internet communication	B.W38	multiple choice test
W13	concepts related to on-line data transmission	B.W41	multiple choice test
W14	the opportunities and limitations offered by new information technology simulation techniques on examples of selected European research projects	B.W46	multiple choice test
W15	principles for the development of databases for patient care and research	B.W48	assignment report, multiple choice test
Skills – Student can:			

Code	Outcomes in terms of	Effects	Examination methods
U1	use databases, including online databases, and search for the necessary information using the available tools	B.U10	assignment report
U2	use on-line databases of the human genome	B.U23	assignment report
U3	use the Internet databases of genetic disorders	B.U24	assignment report
U4	use a telemedicine tool for teleconsultation purposes	B.U25	classroom observation
U5	use on-line photo, audio and video libraries	B.U21	classroom observation
U6	use various types of computer simulators and e-learning tools for educational purposes, with particular emphasis on virtual patients	B.U26	classroom observation, assignment report
U7	use computer simulators to support the medical decision-making process	B.U27	classroom observation, assignment report
U8	provide expert knowledge through simple IT techniques of knowledge representation such as a block diagram or a rule database	B.U28	project
U9	use e-learning platforms	B.U30	classroom observation
U10	plan and perform simple scientific research and interpret its results and draw conclusions	B.U13	assignment report
U11	use equipment for the reproduction of three-dimensional video images	B.U22	classroom observation
U12	protect clinical data against unauthorized access	B.U29	classroom observation, assignment report
U13	prepare materials for on-line presentations	B.U31	project
U14	understand the concept of meta-analysis and how to present its results	B.U20	classroom observation
Social competences – Student is ready to:			
K1	use objective sources of information	O.K7	classroom observation, assignment report
K2	formulate conclusions from own measurements or observations	O.K8	project
K3	implement the principles of professional camaraderie and cooperation in a team of specialists, including representatives of other medical professions, also in a multicultural and multinational environment	O.K9	classroom observation
K4	to be guided by the well-being of a patient	O.K2	classroom observation, assignment report

Calculation of ECTS points

Activity form	Activity hours*
classes	30
preparation for classes	25
preparation for colloquium	5

Student workload	**Hours** 60
Workload involving teacher	**Hours** 30
Practical workload	**Hours** 30

* hour means 45 minutes

Study content

No.	Course content	Subject's learning outcomes	Activities
1.	Searching for information in medical databases, data processing. Resources of the National Center for Biotechnology Information.	W12, W13, W15, W5, W7, W9, U1, U14, U2, U3, U7, K1, K4	classes
2.	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.	W15, W4, W5, W9, U1, U14, U7, U8, K1	classes
3.	Medical 2D and 3D image processing. Using representative medical image viewers supporting the DICOM standard. Reconstruction of 3D models, performing 3D segmentation.	W3, W5, U1, U11, U5, U7, K3, K4	classes
4.	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.	W14, W5, W9, U5, U6, U7, U9, K1	classes
5.	Clinical pathway. Implementation of your own project regarding the clinical pathway. Discussion in group forum on the presented approach.	W4, W5, U7, U8, K1	classes
6.	Issues of modern telemedicine. An approach to support the doctor's work, using remote access technologies. Simulation of real time consunting sessions.	W10, W11, W12, W13, W2, W3, W6, W8, U12, U13, U4	classes
7.	Modeling and simulation in medicine. Performing experiments on computer models. Immersive technologies. The use of augmented and virtual reality in medicine. Presentation of holographic structures in the Hololens system.	W1, W13, W15, W3, W5, W9, U10, U7, K2	classes
8.	Medical robots and tele-surgery. Rules for creating programs controlling the operation of an educational robot with the possibility of interactive impact.	W2, U7, K2	classes
9.	3D technologies in medicine. Presentation of the principles of creating 3D graphics and the use of 3D printing as a rapidly developing and perspective technology in modern medicine.	W1, W3, U11, U5	classes

Course advanced

Teaching methods:

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

Activities	Examination methods	Credit conditions
classes	classroom observation, 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.
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 and perform certain tasks
   prepare and submit the report
4. pass the Final Test (up to 100 pts)
5. 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

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. AI Revolution in Medicine. GP-T and Beyond. Pearson Education, Inc. 2023
3. Simulation in medicine – Computer-aided diagnostics and therapy. Irena Roterman-Konieczna (Ed.) 2020. De Gruyter. ISBN 978-3-11-066687-8
4. Simulation in medicine – Preclinical and clinical applications. Irena Roterman-Konieczna (Ed.) 2015. De Gruyter. ISBN 978-3-11-040626-9

Optional

1. 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.
2. Shortliffe EH, Cimino JJ, Chiang MF. Biomedical Informatics: Computer Applications in Health Care and Biomedicine. (2021). 5th ed. Switzerland: Springer International Publishing.
3. 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.
4. Trowbridge RL, Rencic JJ, Durning SJ. Teaching Clinical Reasoning. (2015). United States: American College of Physicians.
5. Telemedicine Technologies: Information Technologies in Medicine and Telehealth. Fong B., Fong A.C.M, Li C.K. 2011. 1st Ed. Wiley. ISBN 978-0-470-74569-4
6. Biostatistics. A Foundation for Analysis in the Health Sciences. Wayne W. Daniel. 2009. 9th Ed. Wiley. ISBN 978-0-470-10582-5

Kierunkowe efekty uczenia się

Kod	Treść
O.K2	focus on the welfare of the patient
O.K7	use impartial sources of information
O.K8	draw conclusions from own measurements or observations
O.K9	implement the principles of professional camaraderie and cooperation in a team of professionals, including representatives of other medical professions, and in a multicultural and multinational environment
B.U10	use databases, including the internet, and search for the information needed using the tools available
B.U13	plan and perform simple scientific research, interpret the results and draw conclusions
B.U20	understand meta-analysis and know the way to present its results
B.U21	use online libraries of photographs, audio and video recordings
B.U22	use equipment to present three-dimensional video images
B.U23	use online databases of the human genome
B.U24	use online databases of genetic disorders
B.U25	use a telemedicine tool for teleconsultation
B.U26	use different types of computer simulators and e-learning tools for educational purposes with special emphasis on virtual patients
B.U27	use computer simulators to support medical decision-making
B.U28	present expert knowledge using simple computer knowledge representation techniques, e.g. a flowchart or knowledge base
B.U29	protect clinical data against unauthorised access
B.U30	use e-learning platforms
B.U31	prepare materials for an online presentation
B.W26	basic computer and biostatistical tools used in medicine, including medical databases, spreadsheets and introduction to computer graphics
B.W28	possibilities of modern telemedicine as a physician’s support tool
B.W36	online data presentation techniques
B.W38	safe online communication
B.W39	computer aided medical decisions with particular focus on the clinical pathway technique
B.W40	elementary techniques of medical knowledge representation for intelligent computer systems in medicine
B.W41	on-line data transmission-related concepts
B.W42	elements of a hospital patient service system
B.W43	selected online sources of medical information with particular focus on genetic diseases
B.W44	principles of teleconferences operation and organization
B.W45	types of IT tools supporting distance education, with particular emphasis on online simulators
B.W46	opportunities and limitations of new IT simulation techniques with the examples of selected European research projects
B.W47	types of data used in electonic medical record

Kod	Treść
B.W48	principles of creating databases for patient care and research purposes
B.W49	principles of operation and use of an electronic patient record