

SYLLABUS

INTERNATIONAL EUROPEAN
UNIVERSITY



**SCHOOL OF
MEDICINE**

Medical Informatics

2021



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Discipline

 Medical Informatics

Lecturer

 Natalia Atamas'

Lecturer's profile




Consultations (full-time, online)

On-campus consultations

 The third Tuesday of the month from 15:00 to 16:00

Online consultations

 The second Friday of the month from 15:00 to 16:00

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Discipline page



Final control form	Final test	Diff.credit	Exam
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1 Description of the academic discipline (summary)

"Medical Informatics" is an applied, practical science that studies the patterns and methods of obtaining, storing, processing and using knowledge in medical science and practice in order to expand the possibilities of knowledge, prevention and treatment of diseases, protection, and improvement of human health. Medical informatics works with medical information. The general concept of information and its properties is transferred from computer science.

The course consists of two main sections: Fundamentals of information technology in the field of health care; Methodology of processing and analysis of medical information.

2 Pre-requisites and post-requisites of the academic discipline (interdisciplinary links)

The study of the discipline "Medical Informatics" is based on previously acquired knowledge of informatics, physics, mathematics, chemistry, and biology in accordance with the program of secondary school.

3 The aim and tasks of the academic discipline:

The purpose of studying the discipline "Medical Informatics" is the formation of theoretical knowledge, practical skills, and abilities to work with a personal computer, and various applications that are necessary for effective use of modern software, and hardware in the educational process, scientific and professional activities, acquaintance with the newest information technologies, and possibilities of their applications in professional activity that allows to optimize information processes.

The main tasks of the discipline "Medical Informatics" are:

mastering knowledge about the essence of information, and medical information, computer science, and information processes in medicine;

formation of ability and skills to solve typical and complex specialized tasks, practical problems in professional activity in the field of health care, related to the use of personal computer, and work with general purpose programs;

mastering the system of knowledge and skills for research, and / or innovation in medicine using modern approaches, which are characterized by complexity and uncertainty of requirements using computational, and analytical methods;

acquisition of knowledge about modern information technologies in general, and their use in medicine;

study of the principles of storage, retrieval, processing, and analysis of medical and biological information using computer technology.

4 Learning outcomes of the academic discipline

The expected results of studying the discipline "Medical Informatics" are:

formation of students' ability to process state, social and medical information using standard procedures, including modern computer information technology;

possession of personal computer skills, and methodology for searching medical and biological data using information technology;

identify opportunities for the use of information technology in medicine;

formation of students' ability and skills to determine the source, and / or location of the required information depending on its type;

Including,

Knowledge:

- methods of mathematical modeling and statistical processing of medical and biological information;



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4 Learning outcomes of the academic discipline

Skills:

- practical application of acquired knowledge with the use of information technology;
- modeling of problem situations on the basis of system analysis using modern software;

5 ECTS credits

3 credits / 90 hours

6 The structure of the discipline

Thematic plan of lectures	Hours		
	Lectures	Practice	Self-study
Section 1. Fundamentals of information technology in the field of health care			
1. Basic concepts of the discipline "Medical Informatics".		3	2
2. Coding and classification of medical data		3	2
3. Analysis of biosignals. Methods of processing biosignals.		3	2
4. Visualization of medical and biological data. Processing and analysis of medical images.		3	2
5. Fundamentals of statistical analysis of medical and biological data.		3	2
6. Testing of statistical hypotheses. Correlation analysis.		3	3
7. Fundamentals of Telemedicine.		3	3
8. Application of telecommunication technologies in Medicine.		3	3
Section 2. Methodology of processing and analysis of medical information			
9. Network diagnostic systems.		3	3
10. Formal logic in solving problems of diagnosis, treatment, and prevention of diseases.		3	3
11. Decision making support methods. Strategies for obtaining medical knowledge.		3	3
12. Clinical decision support systems.		3	3
13. Modeling of decision support system.		3	4
14. Types of information systems in the field of health care. Hospital information systems.		3	4
15. Information Systems at the level of medical and preventive institutions. Public health and health care.		3	3
16. Final test		3	
Total:		48	42



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Mandatory tasks

1. Task execution (calculation work).
2. Task execution (graphical representation of data). Data and information.
3. Rules for presentations using standard software packages. Registration and printing of documents.
3. Work with textual information. Using the Word text editor. Registration, and printing of documents.
4. Work with medical data models. Execution of practical tasks.
4. Task execution with use of WHO databases, the Ministry of Health, and Database "Health for All".
5. Work with PDB database
6. Registration, transformation, and classification of biosignals.
7. MRI and ultrasound images errors analysis. Medical image processing.
8. Construction of algorithms for medical problems solving with the use of different types of algorithms.
9. Building a block diagram of a simple (linear) and branched algorithm. Drawing up a block diagram of an algorithm with an internal cycle.
10. Construction of the truth table using logical operators.
11. Using a test decision support system.
12. Using a decision support system with simple forecasting tools to solve test problems.
13. Studying the medical literature databases, and methods of their analysis.
14. Work with traditional, and electronic medical records (electronic medical history).
15. The use of information resources in evidence-based medicine - a comparative analysis of information resources.
16. Performing tasks from biomolecules using software packages VMD and NAMD.
17. Execution of the task of analysis of impact factors of medical scientific journals, and publications
17. Execution of the task on the analysis of possibilities of use of chemical substances in medicine with use of QSAR methodology.
18. Performing the task of analyzing the structure of albumin.
19. Performing the task of classifying drugs based on WHO databases.
20. Execution of the task of classification of diseases on the basis of WHO databases.

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Elective tasks

1. Computer applications in the health care system.
2. The Internet. Communication in the health care system.
3. Means of obtaining images.
4. Statistical methods in medical informatics.
5. Model of population epidemic dynamics.
6. Mathematical models in the processing and transformation of biosignals, MRI and ultrasound data.
7. Methods of statistical processing, and theory of errors.
8. The normal law of distribution of a random variable.

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Signs of discipline

Term of teaching	Semester	International disciplinary integration	Course (year of study)	Cycles: general training / vocational training / free choice
One semester,	3st	Yes	2	General



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Assessment system and requirements

Overall discipline assessment:

Current student performance is assessed due to the 4-point grading scale (2; 3; 4; 5) at each practical (seminar, laboratory) class.

The final test on the discipline "Medical Informatics" is carried out in the form of a graded test. The graded test on the discipline is conducted in the form of a written test on individual variants, each of which contains 3 theoretical questions and one problem.

Written work requirements:

Practical tasks and homework assignments should be prepared in a written form and provided to the lecturer for checking and assessment.

Students are admitted sitting the final graded test if they do not have missed or undone practical classes, and if their average current grade is at least 3 points due to the 4-point scale \ 120 points due to the 200-point scale.

<https://ieu.edu.ua/docs/rate-of-study.pdf>

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Discipline policy

The learning process on Medical and Biological Physics is supposed compliance with the rules that ensure effective mastery of the subject, both in theory and on practice, namely:

- lecturer and students are present in the classroom in accordance with the schedule, and the established time mode
- students attend classes regularly without missing
- lecturer and students are neatly dressed in appropriate clothing, namely in a white lab coat while the class time
- lecturer lays out the course fully in the line with the curriculum of the discipline
- students lead notes of lectures and practices
- the learning of the discipline is based on a team spirit, cooperation, and solidarity of the lecturer with the students
- subject issues are discussed in the form of free discussion between lecturer and students, and among students themselves
- lectures and practical classes conducting, except for the final test, involves independent work of students with use of information technology, and respective means of processing, storage and transmission of information, including computers, personal gadgets, and other electronic devices, as well as textbooks, manuals, methodical developments, etc.
- scientific research work of students is welcome
- essay writing is essential, and obligatory part of the learning process, and self-study
- topics of the subject matter is considered in terms of their practical importance and bioethical consistency
- mutual behavior of lecturer and students in classroom and in extracurricular time has to follow the generally accepted norms and patterns of behavior, which provide mutual respect, collegial way of relationships, and excludes religious, racial, ethnic, cultural, age, gender, social, political, and other prejudices, as well as bullying, sexual harassment, and other manifestations and forms of intolerance, and humiliation of human dignity
- any signs of corruption in the learning process, made by lecturer or by students are unacceptable

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Policy of absence and late task performance

Students who miss current control for valid reasons confirmed by documents have the right to take current control within two weeks after returning to studying.



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Policy of absence and late task performance

Students who have missed classes without valid reasons, have not participated in current control activities, have not liquidated academic failure are not admitted to final semester control of this discipline. In this case, an academic staff member puts a mark 'non-admission' in the exam record.

Repeated taking of the grading exam of the discipline is appointed in case of accomplishing all types of educational, individual work stipulated by the working program of the academic discipline and is carried out according to the approved schedule of academic failure liquidation.

<https://ieu.edu.ua/docs/050.pdf>

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Policy of academic integrity

Participants of the educational process rely on the academic integrity principles according to the Code of Academic Integrity of academic, scientific and teaching staff and students of International European University

<https://ieu.edu.ua/docs/011.pdf>

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Recommended Literature

Basic literature

1. Medical informatics in modules: workshop / IE Bulakh, LP Voitenko, MR Mruga, etc .; for order. IE Bulakh. –K .: Медицина, 2012. - 208 c.
2. Handbook of Medical Informatics. Editors: J.H. van Bommel, M.A. Musen. - <http://www.mieur.nl/mihandbook>; <http://www.mihandbook.stanford.edu>
3. Mark A. Musen B. Handbook of Medical Informatics // Electronic resource <ftp://46.101.84.92/pdf12/handbook-of-medical-informatics.pdf>
4. Edward H., Shortliffe J., Cimino J. Biomedical Informatics, 2014 // Electronic resource <http://www.rhc.ac.ir/Files/Download/pdf/nursingbooks/Biomedical%20Informatics%20Computer%20Applications%20in%20Health%20Care%20and%20Biomedicine-2014%20-%20CD.pdf>
5. Medical Informatics: Computer Applications in Health Care and Biomedicine, 2011 // Electronic resource <https://books.google.com/books?id=WYvaBwAAQBAJ&pg=PA321&lpg=PA321&dq=book++medical+informatics&source=bl&ots=VjPvStLtlk&sig=b39YVv0Blts31QsJkUf4bnAjtQfY&hl=uk&sa=X&ved=0ahUKEwiqkeTdpIzQAuUGWSwKHTyIBfw4ChDoAQhHMAc#v=onepage&20=book%20%20book%20>

Auxiliary

1. Informatics in tables and diagrams: PC and its components, Windows operating system, Internet, basic and auxiliary devices, system and application software, modeling and programming / [Bilousova LI, Olefirenko NV]. - Kharkiv: Torsing Plus, 2014. - 111 p.
2. Lepoch SN, Chubenko AV, Babich PN Statistical methods in biomedical research using EXCEL. - K .: 2001. - 408 c.
3. Information systems and technologies: Textbook. way. for students. higher textbook zakl./ SG Karpenko, VV Popov, YA Tarnavsky, GA Shportyuk. – K: 2004. - 192 p.
4. Paul J. Perry. Secrets of the World Wide Web. "Dialectics". Kiev. 1996. 576p.
5. Medical informatics: a textbook / I.E. Bulakh, Yu.E. Haimzon. - K .: «Medicine», 2012. - 424 c.
6. Medical Informatics = Medical Informatics: textbook / I.E. Bulakh, Yu.Ye., Martsenyuk, I.Y. Haimzon. - K .: «Medicine», 2012. – 368p.
7. Information technologies in psychology and medicine: textbook / I.Ye. Bulakh, II Haimzon. - K .: BCB «Medicine», 2011. - 216 c.



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Recommended Literature

8. Informatics in tables and diagrams: PC and its components, Windows operating system, Internet, basic and auxiliary devices, system and application software, modeling and programming / [Bilousova LI, Olefirenko NV]. - Kharkiv: Torsing Plus, 2014. - 111 p.
9. Fundamentals of computer science. Microsoft Office 2013 (Word, PowerPoint in practice): textbook. way. / MM Drin, NV Romanenko; City of Education and Science of Ukraine, Cherniv. nat. Univ. Yu. Fedkovich. - Chernivtsi: Chernivtsi. nat. University, 2014. - 75 p.
10. Informatics and information technologies: a workshop for org. students' work on practice. and laboratory. classes / Yu. Yu. Bilak, V. O. Laver, Yu. V. Andrashko, IM Lyakh; City of Education and Science of Ukraine, SHEI "Uzhhorod. nat. University ", Faculty of Inform. Technologies, Dept. Informatics and Phys.-Math. disciplines. - Uzhhorod: Outdoorshark, 2015.
11. Informatics: workshop on inform. technologies / Ya. M. Glinsky. - Ternopil: Nearby. and manual., 2014. - 302 p.
12. Mincer OP Informatics and health care / O.P. Minzer // Medical Informatics and Engineering. - 2010. - № 2. - P.8 -21
13. Computer modeling in pharmacy: Textbook. way. for honey. University IV r.a. Recommended by the Ministry of Health / Bulakh IE etc. - K., 2016. - 208 p.

INFORMATION RESOURCES

1. <https://support.office.com/uk-ua/> (Microsoft Office Help and Training Materials)
2. www.uacm.kharkov.ua (Ukrainian Association of Computer Medicine)
3. www.mednavigator.net (Medical search engine)
4. www.rmj.ru (Internet versions of periodicals)
5. www.medinfo.com.ua (Medical search system of Ukraine)
6. www.medico.ru (Medical search system)
7. www.medinf.nmu.ua (Information resources of educational and methodical materials on the subject "European standard of computer literacy").

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Tips on successful study during the course

- Class attendance
- Dialogue with the lecturer regarding the educational program issues
- Accomplishment of tasks according to the program
- Essay writing on program topics
- Discussion of topics and tasks in groups in the out-of-class time
- Usage of online resources