



SYLLABUS

Course title

OC 2.2 Health Informatics

Course information

222 Medicine OP

Course description:

The Health Informatics academic discipline is aimed at introducing modern information technologies and their application in healthcare to students. The course covers gaining competence in working with basic software, medical statistics, telemedicine, as well as integrating information systems into medical institutions. Attention is also given to medical data security and confidentiality issues. The discipline is taught to students of higher medical education institutions who acquire knowledge, skills and competencies in the public health area, specialty: Medicine, educational qualification of the second (Master) level of higher education. The academic discipline consists of two main sections, namely: office software and digital communication; statistical and information tools in healthcare.

Prerequisites for study (previous requirements):

The study of the discipline is based on previously acquired knowledge in informatics, physics, mathematics, chemistry, and biology in accordance with the program of general secondary education schools.

Number of credits/hours:

2 ECTS credits / 60 hours.

Discipline features

Period of teaching	Semester	International discipline integration	Year of study	Courses: general training/professional training/elective
1 semester	1	available	1 st year	General training course

Mode of study:

Offline

Classroom location:

42V Akademika Hlushkova Ave., 4th floor, room 405

Information about the lecturer

Lecturer's full name:

Kostiantyn Balashov, PhD

Andrii Mohilnytskyi, Leading Specialist

Department:

Department of Fundamental, Medical and Preventive Disciplines

**Office location:**

42V Akademika Hlushkova Ave., 4th floor, Dean's Office, room 425

Work and consultation schedule:

Meeting with the lecturer is an important part of your success in this course. Whether you have specific questions, needs, or concerns, or you simply want to discuss your progress, we recommend you to schedule at least one meeting with your lecturer during the semester. We are always available during working hours from 9 a.m. to 4 p.m. (Kyiv time). Given below a few possible ways to contact your lecturer:

- Regular in-person consultations at the Department: every third Tuesday of the month from 3 p.m. to 4 p.m. or every second Friday of the month from 3 p.m. to 4 p.m.
- Schedule a meeting by sending an email to kostyantyn.balashov@ieu.edu.ua or using the Google Calendar scheduling system via the corporate IEU email. You can meet in person or virtually via Zoom/Google Meet.
- We can also arrange special Zoom/Google Meet sessions to meet with small groups to provide support while working on projects, assignments, or exam preparation.
- Keep in mind that meeting with your lecturer is an integral part of your success in this course. Don't hesitate to reach out, and you will receive the necessary support throughout the semester.

Lecturer's e-mail:

kostyantyn.balashov@ieu.edu.ua

Course objectives / Learning outcomes

Course objectives

The goal of the academic discipline is to introduce modern information technologies and their application in the medical sector to students in order to improve the quality and efficiency of medical services, particularly:

- Understanding information technologies: to help students grasp the fundamental principles and concepts of modern information systems, including e-health, telemedicine, statistical data analysis, and information visualization.

- Mastering practical skills: to teach students to use various software tools and online resources for processing, analyzing, and presenting medical data.
- Enhancing the efficiency of medical processes: to improve operations of medical institutions by adopting information technologies that simplify access to information, increase diagnostic accuracy, and ensure more effective management of medical documentation.
- Preparing for challenges of future medicine: to equip students with the understanding and readiness to apply state-of-the-art technologies in their future professional activities, as digital tools become an essential component of any medical practice.

The role of the academic discipline in achieving program learning outcomes

Program learning outcomes (PLO)	
PLO 1.	To have comprehensive knowledge of the structure of professional activities. To be able to carry out professional activities requiring updating and integration of knowledge. To be responsible for professional development, ability to further professional training with a high level of autonomy.
PLO 2	To understand and know fundamental and clinical biomedical sciences at the level sufficient to solve professional tasks in the healthcare sector.
PLO 21	To find necessary information in professional literature, databases and other sources; to analyze, assess and apply this information.
PLO 22	To apply cutting-edge digital technologies, specialized software and statistical methods of data analysis to solve complicated healthcare problems.

Learning outcomes

Key learning outcomes of the discipline:

- to provide students with a knowledge system about the essence of information processes in medicine, existing health information systems, and the principles of digital health;
- to develop the ability and skills to solve typical and complex specialized tasks and practical problems in healthcare professional activities related to the use of personal computers and general-purpose software;
- to develop a system of knowledge and skills for conducting research and/or implementing innovations in medicine using modern approaches characterized by complexity and uncertainty in requirements, employing computational and analytical methods;
- to provide information about state-of-the-art information technologies in general and in medicine;
- to study the principles of storing, searching, processing, and analyzing medical and biological information using computer technologies, which is an integral part of the professional competence of future healthcare specialists and is the foundation for studying professional natural and clinical disciplines at higher medical education institutions in Ukraine.

Achieving the stated goal and fulfilling the corresponding tasks will enable medical students to acquire the knowledge and skills in information technologies used in medicine, which are essential for the direct development of a doctor and researcher, a professional in their field, as well as for studying other theoretical and clinical disciplines at higher medical education institutions.

Course content

Course materials and requirements

Section 1. Office programs and digital communication

Topic 1. Basic concepts of the discipline. The use and configuration of peripheral devices. Working with office programs in medical practice (Microsoft Word, Microsoft Excel, Microsoft PowerPoint, Adobe Acrobat).

Topic 2. Digital tools for professional electronic communication and data exchange in the medical sector.

Section 2. Statistical and informational tools in Ukraine's healthcare

Topic 3. Fundamentals of statistical analysis and visualization of medical data (Jamovi, Tableau Public, Lucidchart). Management of bibliographic data and checking for academic plagiarism.

Topic 4. The use of informational tools and online resources in medical practice (Institute for Health Metrics and Evaluation, Tools from the European Regional Office of the World Health Organization).

Topic 5. Electronic signature and working with the Diia online service for signing medical documentation. The use of electronic health services (Ehealth) for healthcare professionals. Methods of decision support. Forecasting and modeling tools. Telemedicine. Big Data. Artificial intelligence.

Books and materials

Primary literature:

1. Framework for Digital Competence of Healthcare Professionals ([online](#))
2. Medical Informatics in Modules: Workshop / I.Y. Bulakh, L.P. Voitenko, M.R. Mruha, et al.; edited by I.Y. Bulakh. - K.: Medicine, 2012. - 208 p.
3. Handbook of Medical Informatics. Editors: J.H. van Bommel, M.A. Musen. – <http://www.mieur.nl/mihandbook>; <http://www.mihandbook.stanford.edu>
4. Mark A. Musen B. Handbook of Medical Informatics // Electronic resource: <ftp://46.101.84.92/pdf12/handbook-of-medical-informatics.pdf>
5. 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>
6. Medical Informatics: Computer Applications in Health Care and Biomedicine, 2011 // Electronic resource: <https://books.google.com.ua/books?id=WYvaBwAAQBAJ&pg=PA321&lpg=PA321&dq=book++medical+informatics&source=bl&ots=VjPvStLtIk&sig=b39YVoBlTS3IQSJKUf4bnA jTqfY&hl=uk&sa=X&ved=0ahUKEwiqkeTdplzQAUGWSwKHTyIBfw4ChDoAQhHMAc#v=onepage&q=book%20%20medical%20informatics&f=false>

Additional literature:

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 L.I., Olefirenko N.V.]. - Kharkiv: Torsing Plus, 2014. - 111 p.
2. Lopoch S.N., Chubenko A.V., Babych P.N. Statistical Methods in Biomedical Research Using EXCEL. - K.: Morion, 2001. - 408 p.
3. Information Systems and Technologies: Study Guide for Students of Higher Education

- Institutions / S.H. Karpenko, V.V. Popov, Y.A. Tarnavskiy, H.A. Shportiuk. - K.: IAPM, 2004. - 192 p.
4. Paul J. Perry. Secrets of the World Wide Web. Kyiv. 1996. 576 p.
5. Medical Informatics: Textbook / I.Y. Bulakh, Y.Y. Liakh, V.P. Martseniuk, I.I. Khaimzon. - K.: Medicine All-Ukrainian Specialized Publishing House, 2012. - 424 p.
6. Medical Informatics: Textbook / I.E. Bulakh, Y.Y. Liakh, V.P. Martseniuk, I.I. Khaimzon. - Kyiv: Medicine All-Ukrainian Specialized Publishing House, 2012. - 368 p.
10. Information Technologies in Psychology and Medicine: Textbook / I.Y. Bulakh, I.I. Khaimzon. - K.: Medicine All-Ukrainian Specialized Publishing House, 2011. - 216 p.
7. Fundamentals of Computer Science. Microsoft Office 2013 (Word, PowerPoint in practice): Study Guide / M. Drin, N. Romanenko; Ministry of Education and Science of Ukraine, Yurii Fedkovych Chernivtsi National University. - Chernivtsi: Chernivtsi National University, 2014. - 75 p.
8. Informatics and Information Technology: Workshop for the Organization of Students' Work During Practical and Laboratory Classes / Y.Y. Bilak, V.O. Laver, Y.V. Andrashko, I.M. Liakh; Ministry of Education and Science of Ukraine, Uzhhorod National University, Faculty of Information Technology, Department of Informatics and Physical and Mathematical Disciplines. - Uzhhorod: Outdoor Shark, 2015.
9. Informatics: Workshop on Informational Technologies / Y.M. Hlynskyi. - Ternopil: Textbooks and Study Guides, 2014. - 302 p.
10. Mintser O.P. Informatics and Healthcare / O.P. Mintser // Medical Informatics and Engineering. - 2010. - No. 2. - P.8 -21
11. Computer Modeling in Pharmacy: Study Guide for Medical Higher Education Institutions of the 4th Accreditation Level. Recommended by the Ministry of Health of Ukraine / Bulakh I.Y. et al. — K., 2016. — 208 p.

Course technical requirements

To access course materials, you will need regular access to a computer and the Internet. Please spend some time to explore the distance learning portal of our University (<https://dist.ieu.edu.ua/>) based on the Moodle system. You will also have to download and create documents, view and create videos.

For questions regarding access to the distance learning platform, IEU students can receive technical assistance from the specialists of the Dean's Office.

Learning process

Mastering the discipline is aimed at providing students with in-depth knowledge of the functioning of information infrastructure and software, the ability to apply it, and the development of the capacity for further professional growth in information technologies used in healthcare.

The learning process involves direct work with the setup of office equipment, installation of software, the ability to create, edit, and improve files used in the doctor's work, as well as creating and using a qualified electronic signature, particularly in working with electronic document management systems.

Students, under the supervision of the lecturer and independently, conduct searches and analyze medical data in professional literature, major global databases, and other sources, ensuring its subsequent visualization and analysis from the perspective of its use by healthcare professionals, while formulating messages clear for the target audience.

Students master specialized statistical software and fundamentals of relevant statistical analysis methods for independent analysis of medical data.

Assessment policy

Summative assessment

Grading scale

Control methods to assess students' learning of the discipline program include:

- oral questioning;
- written (computer) test;
- written test work;
- practical work (connecting the device, installing the software, preparing the electronic document)
- preparation of a presentation, preparation of an analytical note/essay.

The current control of learning progress is carried out at each practical class and assessed according to the 4-point scale.

Sum of points for all types of learning activities	ECTS grade	According to the national scale		Definition
		4-point scale	Pass/Fail	
180 – 200	A	5 (excellent)	pass	Excellent performance with only a few mistakes.
160 - 179	B	4 (good)		Above average performance with several mistakes.
150 – 159	C			Correct work in general with a certain amount of mistakes.
130 – 149	D	3 (satisfactory)		Not bad, but with a significant amount of shortcomings.
120 – 129	E			Performance meets minimum criteria.
50 – 119	Fx	2 (fail)	fail	Possible repeated pass.
0 – 49	F			Repeated course in the discipline is required.

Students who accomplish all types of works, tasks prescribed by the curriculum for the semester according to the academic discipline, attend all classes stipulated by the curriculum, and have the average grade of at least 3 (72 points according to the 120-point scale) for current learning activities are admitted to the semester final control. <https://ieu.edu.ua/docs/rate-of-study.pdf>

The grade for the graded test is given according to the 80-point scale and is converted into the 4-point scale based on the following scheme: 5 – from 71 to 80 points, 4 – from 61 to 70 points, 3 – from 48 to 60 points, 2 – less than 48 points. The maximum amount of points that can be obtained by students during the final control is 80.

The final academic performance is assessed in points of the 200-point ECTS scale and according to the national assessment scale (excellent, good, satisfactory, fail).

Correlation between the results of current learning activities and final control of knowledge: 60% (120 points) and 40% (80 points).

Course policy

General guidelines

The study of the discipline is based on collegiality, cooperation, and solidarity between the lecturer and students. Scientific inquiry and research work by students is encouraged. Topics of the academic discipline are considered in terms of their practical application and bioethical feasibility. Regular attendance of classes without absences, presence of both the lecturer and students during the class according to the schedule and the stipulated class schedule. The lecturer and students should be neatly dressed in a white lab coat during classes. The lecturer is required to fully deliver the course material in accordance with the program of the discipline. Students should take lecture and practical class notes. The mutual behavior of the lecturer and students, as well as students among themselves, both during class and outside of it, adheres to generally accepted norms and role models of conduct, which involve mutual respect and a collegial nature of relationships, excluding religious, racial, ethnic, cultural, age, gender, social, political, or any other biases and prejudices, as well as bullying, sexual harassment, and other forms of intolerance or human dignity violations. Any manifestations of corruption in the educational process, whether by the lecturer or students, are strictly unacceptable.

The academic discipline is aimed at introducing modern information technologies and their application in healthcare to students. The course covers gaining competence in working with basic software, medical statistics, telemedicine, as well as integrating information systems into medical institutions. Attention is also given to medical data security and confidentiality issues. The discipline is taught to students of higher medical education institutions who acquire knowledge, skills and competencies in the public health area, specialty: Medicine, educational qualification of the second (Master) level of higher education. The academic discipline consists of two main sections, namely: office software and digital communication; statistical and information tools in healthcare.

The first section of the discipline covers basic software: working with text, spreadsheets, presentations, using text and graphic editors, spreadsheets, and other software on computers and mobile devices. The second section of the discipline examines various tools and technologies used in healthcare for processing, visualizing, and analyzing medical data. Students will explore software for statistical analysis, data visualization, and working with online health databases. Additionally, they will acquire skills in using digital tools for preparing scientific publications, as well as for conducting research and analyzing scientific information in medicine.

Class attendance and participation

The University's current policies require mandatory attendance at all classes. However, if you are unable to attend one or more classes for a valid reason, please contact your lecturer promptly to arrange a make-up format.

Assessment of learning outcomes can be conducted either through an oral response or a test control format, or through the preparation of an essay or presentation that demonstrates mastery of the necessary methodologies or software.

Academic integrity

All participants in the educational process rely on the academic integrity principles.

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

Late task performance, correction of grades, making up missed classes

Typically (unless a longer period is specified), tasks should be completed by the next class but no later than the Pass/Fail test. If you are unable to complete the task on time, please contact your lecture and inquire about the possibility of extending the deadline.

If you receive an unsatisfactory grade for a specific topic, it can be corrected: usually by completing a practical task or passing a test.

Making up missed classes is conducted in the form an oral response, computer testing, or the preparation of a practical assignment.

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

Repeated taking of the graded test in the discipline is appointed in case of accomplishing all types of educational, independent (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>

Lecturer's response time (regarding checking tasks)

Responses to email inquiries are provided within 24 hours.

Assessment results are available by the next class.

Efficient communication

Communication can be conducted:

- Directly before or after classes
- In the Google Classroom for the course
- Via e-mail

ChatGPT and other generative AI policy

The use of artificial intelligence is encouraged to the extent that it complements but does not replace the student's intelligence.

The use of electronic devices during classes

Please use your electronic devices only for purposes related to the classes, and only if they are necessary to make the course content accessible.

Policy of publication and distribution of course materials

Students are free to use and distribute (for private use for educational or research purposes) all materials obtained within the course in case of specifying authorship and referring to the source.

Expected student workload and engagement

This course can be learned by allocating approximately 4 hours each week: 2 hours during class and 2 hours for completing practical assignments, studying educational materials, preparing for class, etc.

Support services

Dean's Office: medschool@ieu.edu.ua

E-schedule: rozklad.ieu.edu.ua

Library: library.ieu.edu.ua

Course schedule

Class number and date	Issues / topics to be examined	Examples of practical tasks
1. September 3	Introduction. Basic concepts of the discipline. Course structure. The use and configuration of peripheral devices.	The use and configuration of peripheral devices: printers, scanners, flash drives, input devices.
2. September 10	The use of Microsoft Word in medical practice.	The use of Microsoft Word in medical practice. Creating and storing text documents. Text formatting. Editing and collaborative work on documents. Working with tables. Creating automatic tables of contents for multi-page documents. The use of Word specialized features.
3. September 17	The use of Microsoft Excel in storing, analyzing, and organizing medical data.	The use of Microsoft Excel for storing, analyzing, and organizing medical data. Creating tables, formatting data, performing arithmetic operations, using functions for statistical analysis.

Class number and date	Issues / topics to be examined	Examples of practical tasks
		Using Excel to create graphs, charts, and other visual tools for presenting medical information.
4. September 24	The use of Microsoft PowerPoint in medical presentations.	Creating multimedia presentations in Microsoft PowerPoint. Creating slides, adding text and images, using layouts and design.
5. October 1	Electronic signature and the use of the Diia online service for signing medical documentation.	Registration of qualified electronic signature, installation of necessary software, and signing documents according to legal requirements. Working with the Diia online service: accessing documents, signing documents.
6. October 8	The Use of electronic health services (Ehealth) for medical professionals.	The use of electronic health services (Ehealth) for healthcare professionals: logging into the system for healthcare professionals; registering a new patient; entering data on established diagnoses, etc. Principles of data confidentiality and security in healthcare when using electronic services.
7. October 15	Working with PDF files in medical practice using Adobe Acrobat.	Mechanisms for creating PDF files. Editing PDF files. Creating interactive and fillable forms. Adding various types of electronic signatures to PDF files:
8. October 22	Digital tools for professional electronic communication and data exchange in the medical sector.	Skills in finding, installing, and configuring messengers and messaging platforms on computers and mobile devices. Installation and configuration of video conferencing services (Zoom, Google Classroom, GoToMeeting, etc.). Configuring Zoom video conferencing from personal and corporate accounts: adjusting settings for recording, connecting users, commenting, and granting screen-sharing permissions. Google Forms

Class number and date	Issues / topics to be examined	Examples of practical tasks
October 29	The use of information tools from the Institute for Health Metrics and Evaluation in medical practice.	The use of information tools from the Institute for Health Metrics and Evaluation for analyzing statistics on morbidity and mortality, and studying healthcare trends.
November 5	The use of the information tool from the European Regional Office of the World Health Organization (WHO).	The use of the information tool from the European Regional Office of the World Health Organization (WHO) for analyzing statistics related to diseases and the effectiveness of health programs to develop and improve medical strategies.
11. November 12	Fundamentals of statistical analysis using Jamovi Software.	Installation, configuration, and exploration of the Jamovi statistical analysis software.
12. November 19	Visualization of medical data using Jamovi software.	Determining basic statistical indicators (mean, median, standard deviation, etc.) using Jamovi. Conducting statistical analysis using a graphical interface.
13. November 26	Visualization of medical data using Tableau Public.	Registration and features of Tableau Public. Visualizing medical data sets using graphs, charts, and other visual elements.
14. December 3	Creating medical diagrams using Lucidchart.	Registration and features of Lucidchart. Creating organizational charts, flowcharts, and process diagrams.
15. December 10	Management of bibliographic data and academic plagiarism checking.	Methods for creating and formatting bibliographies, inserting references into research and academic articles. Understanding DOI (Digital Object Identifier) and its importance in scientific publications for identifying and citing specific studies.
16. December 17	Decision support methods. Forecasting and modeling tools. Telemedicine. Big Data. Artificial intelligence. Final test.	Overview of AI capabilities for professional, including medical activities.

Class number and date	Issues / topics to be examined	Examples of practical tasks
		Working with text, images, decision support systems, and communication with patients.

Tips on successful study

If you want to succeed in this discipline, you should:

1. Be active, insistent, curious, consecutive.
2. Be tidy and polite, attend classes in a medical gown.
3. Systematically prepare for practical classes, take lecture notes, and accomplish tasks for independent work.
4. Solve tests and tasks on your own, work actively during the class.
5. Take part in student scientific conferences and be engaged in research activities in scientific groups at the Department.

We wish you insistence, goal commitment and motivation to study. And you'll definitely succeed! See you at classes!