

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE RUSSIAN FEDERATION

**Federal State Autonomous Educational Institution of Higher Education
«National Research Lobachevsky State University of Nizhny Novgorod»**

Институт клинической медицины

УТВЕРЖДЕНО

решением Ученого совета ННГУ

протокол № 10 от 02.12.2024 г.

Working programme of the discipline

Informatics, medical informatics

Higher education level

Specialist degree

Area of study / speciality

31.05.01 - General Medicine

Focus /specialization of the study programme

General Medicine

Mode of study

full-time

Nizhny Novgorod

Year of commencement of studies 2025

1. Место дисциплины в структуре ОПОП

Дисциплина Б1.О.12 Информатика и медицинская информатика относится к обязательной части образовательной программы.

2. Планируемые результаты обучения по дисциплине, соотнесенные с планируемыми результатами освоения образовательной программы (компетенциями и индикаторами достижения компетенций)

Формируемые компетенции (код, содержание компетенции)	Планируемые результаты обучения по дисциплине (модулю), в соответствии с индикатором достижения компетенции		Наименование оценочного средства	
	Индикатор достижения компетенции (код, содержание индикатора)	Результаты обучения по дисциплине	Для текущего контроля успеваемости	Для промежуточной аттестации
ОПК-10: Способен понимать принципы работы современных информационных технологий и использовать их для решения задач профессиональной деятельности	ОПК-10.1: составляет и планирует решение стандартных профессиональных задач ОПК-10.2: использует информационные, библиографические ресурсы, медико-биологическую терминологию, информационно-коммуникационные технологии ОПК-10.3: знает и учитывает основные требования информационной безопасности	ОПК-10.1: to know the theoretical foundations of medical informatics; methods of collecting, storing, searching, processing, converting and distributing information in medical information systems; types, structure, characteristics and basic principles of building medical information systems; principles of automation and management of healthcare institutions using modern computer technologies; basic requirements of information security; be able to analyze, text and graphic processing of medical data using standard software tools, as well as applied and special software tools; determine the functionality of medical information systems; use modern information and information and communication technologies to solve professional tasks; possess basic information transformation technologies - text, tabular editors, Internet search; basic methods of statistical processing of clinical and experimental data using standard applied and special software tools; terminology related to modern information and telecommunication	Задания	Зачёт: Эссе

		<p><i>technologies in relation to solving medical and healthcare problems; basic skills in using medical information systems and Internet resources to solve professional tasks, taking into account the basic requirements of information security.</i></p> <p><i>OIIK-10.2:</i> <i>be able to analyze, text, and graphically process medical data using standard software tools, as well as applied and special software tools; determine the functionality of medical information systems; to use modern information and communication technologies to solve the tasks of professional activity</i></p> <p><i>OIIK-10.3:</i> <i>possess basic information transformation technologies - text, tabular editors, Internet search; basic methods of statistical processing of clinical and experimental data using standard applied and special software tools; terminology related to modern information and telecommunication technologies in relation to solving medical and healthcare problems; basic skills in using medical information systems and Internet resources to solve professional problems, taking</i></p>		
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		into account the basic requirements information security.		
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3. Структура и содержание дисциплины

3.1 Трудоемкость дисциплины

	очная
Общая трудоемкость, з.е.	2
Часов по учебному плану	72
в том числе	
аудиторные занятия (контактная работа):	
- занятия лекционного типа	14
- занятия семинарского типа (практические занятия / лабораторные работы)	28
- КСР	1
самостоятельная работа	29
Промежуточная аттестация	0 Зачёт

3.2. Содержание дисциплины

(структурированное по темам (разделам) с указанием отведенного на них количества академических часов и виды учебных занятий)

Наименование разделов и тем дисциплины	Всего (часы)	в том числе			
		Контактная работа (работа во взаимодействии с преподавателем), часы из них			Самостоятельная работа обучающегося, часы
		Занятия лекционного типа	Занятия семинарского типа (практические занятия/лабораторные работы), часы	Всего	
	о ф о	о ф о	о ф о	о ф о	о ф о
Technical and software tools for implementing information processes. Basic information transformation technologies.	6	2	2	4	2
Medical information systems. Databases. Database management systems	8	2	4	6	2
Medical information. Computer analysis of medical data.	24	4	10	14	10
Computer modeling in medicine	10	2	4	6	4
Medical instrumentation and computer systems	16	2	6	8	8
Computer communications in medicine. Telemedicine. Fundamentals of information security	7	2	2	4	3

Аттестация	0				
КСР	1			1	
Итого	72	14	28	43	29

Contents of sections and topics of the discipline

Технические и программные средства реализации информационных процессов. Базовые технологии преобразования информации.

Медицинские информационные системы. Базы данных. Системы управления базами данных

Медицинская информация. Компьютерный анализ медицинских данных.

Компьютерное моделирование в медицине

Криптотехнологии

4. Учебно-методическое обеспечение самостоятельной работы обучающихся

Самостоятельная работа обучающихся включает в себя подготовку к контрольным вопросам и заданиям для текущего контроля и промежуточной аттестации по итогам освоения дисциплины приведенным в п. 5.

Учебно-методические материалы, необходимые для осуществления образовательного процесса по дисциплине «медицинская информатика»:

- Конспекты лекций по дисциплине
- Методические разработки практических занятий для преподавателей по дисциплине
- Оценочные материалы для проведения текущего контроля по дисциплине

5. Assessment tools for ongoing monitoring of learning progress and interim certification in the discipline (module)

5.1 Model assignments required for assessment of learning outcomes during the ongoing monitoring of learning progress with the criteria for their assessment:

5.1.1 Model assignments (assessment tool - Assignments) to assess the development of the competency ОПК-10:

1. Describe the possibilities of group data processing in a table processor.*
2. Describe the capabilities of the Microsoft Access database management system.**
3. Describe the capabilities of information systems used in professional activities.*
4. Describe the capabilities of the Microsoft Word word processor.*
5. Give generalized concepts of information technology and information system, describe the relationship between them.***
6. Describe the typical structure of the information processing process

Technology allows you to use text, graphics, audio and video information.*- animation, interactive animation, and thereby expands the scope of computer application in management. virtual reality expert systems of geographic information systems of multi media The main functions of database management systems are: publishing datasets , creating an empty (unfilled) database structure , providing the means to fill it

in or import data from tables in another database , providing access to data, as well as providing search and filtering tools _____ data warehouse – an online storage model in which data is stored on numerous servers distributed on the network, provided for use by clients, mainly by a third party. Cloud _____ networks cover a limited area within the distance of station no more than tens or hundreds of meters from each other and represent the most widespread and elementary form of networks. Local Global Hierarchical Distributed

Topics

- How can computer discovery help in organization of doctor-patient cooperation*
- What fields of medicine do technological breakthroughs cover and why**
- What diagnostic method is used to get small sample of tissue with minimal pain. Explain your point of view.**
- Brain surgery, laparoscopic surgery and laser surgery are becoming more commonplace today, aren't they. Explain your point of view.*
- Have modern medical technologies led to any problems in the modern world? Give the examples. Explain your point of view.
- What is a negative influence of new medical technologies on people. Explain your point of view.*
- Breakthroughs in medicine from the point of view of medical informatics. Give the examples and explain.**
- Introduction in medical management. How to make the medical center/. Step by step.*
- CT is the universal method in diagnostic. Agree or disagree. Explain your point of view.**
- Robotics in surgery always better than real doctors. Agree or disagree. Explain your point of view.*
- Ultrasonography as the universal method. Agree or disagree. Explain your point of view.**
- Telemedicine. What is a possible situation when it might be necessary to use? Explain your point of view.*
- Virtual reality never used in medicine. Agree or disagree. Explain your point of view.*

First block

1. Medical informatics as branch of science. Personal computer: devices. Labour protection working on PC.*
2. Graphic interface of Microsoft Windows. Disk operations, files.*
3. Ways of creation of text documents with Microsoft Word. Usage of tables.*
4. Formation of text in documents Microsoft Word. Illustrations.*
5. Automatization of calculations with electronic tables. Microsoft Excel. Peculiarities of interface.**
- Table structure.
6. Analyzing of medical and biological information with electronic tables. Using formulas, making* diagrams, preparing documents for print.
7. Information inquiry system of medical-biological data.*
8. Browser Internet Explorer. Navigation in e-net. Medico-biological resources of E-net.*
9. Sending messages with electronic post.*

2ND block

1. Labour protection while working on PC. Microsoft Office. Simultaneous work with several** documents. Creation of complex documents on example of text redactor Microsoft Word.

Using

Microsoft Word as table publishing system.*

2. Statistic analyses of information with the help of electronic tables. Their usage for analyzing data**

and statistic analyses of the results of medical and biological experiment.*

3. Prove of the hypothesis of medical and biological experiment with functions of Excel.*

4. Creation and usage of multimedia documents. Multimedia opportunities of modern PC.**

Presentation: using graphic, video, animation.

5. Microsoft Access. Creation of the tables, forms.*

6. Electronic library "MARC"-SQL.*

7. Antivirus defense of PC and local administration network. Preventive measures.

Antivirus**

programs (Kaspersky Anti-Virus, Symantec Antivirus).*

8. Reserved copying and archivation as elements of safety. WINRAR, WINZIP.*

9. Effective search in e-net. Working with the most popular search E-net systems.*

MEDICAL REHABILITATION

1. Basic problems of MA, the organization of service, the documentation.*

2. Methods of definition of reserves of the functional systems of an organism. Physical development.*

3. The functional loading tests. An assessment of rehabilitational opportunities. The medical conclusion.*

4. The basis of a physical aftertreatment in different cases.*

5. Rehabilitation in clinic of internal diseases. Basic contingents of the patients being* subjected to rehabilitation (patients with angina, hypertension, asthma, chronic bronchitis, patients* with various diseases of joints, peptic and duodenal ulcers, rheumatic disease). An assessment of reserves of the functional systems of an organism and rehabilitational opportunities of patients. Development of the individual program of rehabilitation.

6. Rehabilitation in surgical and traumatological clinics. Basic contingents (patients after operative treatment of the internal organs of thoracic and abdominal cavities, patients with consequences of traumas of the upper and lower limbs, a column). An assessment of functionalities of the defensive systems of an organism, forecasting of rehabilitational potential. Development of the individual program of the rehabilitation.***

7. Rehabilitation in neurologic clinic. Basic contingents of the patients (patients with neurologic manifestations of osteochondrosis, patients with consequences of infringements of the cerebral circulation, patients with consequences of various disorders central and periphery motorial neurones, patients with ICP, patients with consequences CCT)****

PUBLIC HEALTH AND HEALTH CARE SYSTEM

1. Public health and health care system as branch of science and subject of teaching. Public health and methods of its research. Statistics, its significance for theory and practice of Health care system.*

2. Organization of statistical research of public health. Methods of standardization. Graphic reflection of statistic research of population, its steps. Graphic plotting in statistics. Parametrical methods of an assessment of statistical research reliability of special and standardized parameters. Direct method of standardization. Dynamic series, their use for characteristic of population health.*

3. Demography. Its medic-social aspects. Procedure of demographic processes study. Statistics of children's death. Process of population reproduction in different countries. Morbidity, its types, methods of research, significance in doctors' activities and health care subdivisions. Methods of studying and valuation of physical development. Trends of demography process changing in

Belarus and other countries. Epidemiology. Significance of methods of disease research for practical medicine. Methods and ways of information maintenance of medical- hygiene knowledge. Propaganda of healthy way of life.**

4. State social insurance and social ensuring. Medical findings of temporary disability, its aims, functions.*
5. Medic-social findings and rehabilitation. Organization of temporary invalidity examination. Organization of proof loss*
6. Preventive principle in health care system. Dispanserization, its types. Organization of out-door patients' help.**
7. Organization of hospital, emergent medical help.
8. Health care of mother and child. Organization of gynecological help. Medical-preventive help to children and teenagers.*
9. Features of rendering of the treatment-and prophylactic help by the workers of the industrial plants and private enterprises. Medic-sanitary division, aims, structure, functions. System of health care of rural population.*
10. Valuation of medical work of single doctors and organizations upon the final result.
11. National health care systems and modern trends of development. Laws in health care system.*
12. Medical findings of labor disability.*
13. Medical statistics and modern methods of measuring of public health. Ways of development.
14. Economy, planning, finances in health care system in modern conditions*

Medical and ethical problems of the patient

Features of the modern patient. Conditions of an establishment of " therapeutic cooperation » between the doctor and the patient.*

An internal picture of illness. Stages of personal reaction to illness. Types of the attitude to illness: нормосоматозогнозия, гиперсоматозогнозия, гипосоматозогнозия, диссоматозогнозия. The factors influencing formation of types of the attitude{relation} to illness. Pathological reactions to illness: depressive, phobial, hysterical, hypochondrial, an anosognosia.*

Public associations and the organizations of patients. Rights and duties of the patient.

Theme 8. Medical and ethical features of activity of a family doctor

Modern condition and problems of family medicine. System of preparation of the family doctor. Rights and duties of the family doctor. Ethical rules of dialogue of the family doctor with the patient.*

Telemedicine

Table of Content:

Telemedicine Definition**

Difference between Telemedicine and Telehealth*

History of Telemedicine*

Benefits of Telemedicine*

Shortcomings of Telemedicine*

Types of Telemedicine Services*

Applications of Telemedicine*

Which medical specialties can use Telemedicine*

Business Association Agreement (BAA) and HIPAA

Telehealth Regulations*

Telemedicine Reimbursement*

What to consider before starting telemedicine practice*

Different Types of Telemedicine Software Solutions*

What is the Barriers of Telemedicine*

Future of Telehealth*

Telemedicine Terminology**

Assessment criteria (assessment tool — Assignments)

Grade	Assessment criteria
pass	The student demonstrates satisfactory knowledge
fail	Knowledge is insufficient, incoherent, and lacks practical skills

5.2. Description of scales for assessing learning outcomes in the discipline during interim certification

Шкала оценивания сформированности компетенций

Уровень сформированности компетенций (индикатора достижения компетенций)	плохо	неудовлетворительно	удовлетворительно	хорошо	очень хорошо	отлично	превосходно
	не зачтено		зачтено				
<u>Знания</u>	Отсутствие знаний теоретического материала. Невозможность оценить полноту знаний вследствие отказа обучающегося от ответа	Уровень знаний ниже минимальных требований. Имели место грубые ошибки	Минимально допустимый уровень знаний. Допущено много негрубых ошибок	Уровень знаний в объеме, соответствующем программе подготовки. Допущено несколько негрубых ошибок	Уровень знаний в объеме, соответствующем программе подготовки. Допущено несколько несущественных ошибок	Уровень знаний в объеме, соответствующем программе подготовки. Ошибок нет.	Уровень знаний в объеме, превышающем программу подготовки.
<u>Умения</u>	Отсутствие минимальных умений. Невозможность оценить наличие умений вследствие отказа обучающегося от ответа	При решении стандартных задач не продемонстрированы основные умения. Имели место грубые ошибки	Продemonстрированы основные умения. Решены типовые задачи с негрубыми ошибками. Выполнены все задания, но не в полном объеме	Продemonстрированы все основные умения. Решены все основные задачи с негрубыми ошибками. Выполнены все задания в полном объеме, но некоторые с недочетами	Продemonстрированы все основные умения. Решены все основные задачи. Выполнены все задания в полном объеме, но некоторые с недочетами.	Продemonстрированы все основные умения. Решены все основные задачи с отдельным и несущественными недочетами, выполнены все задания в полном объеме	Продemonстрированы все основные умения. Решены все основные задачи. Выполнены все задания, в полном объеме без недочетов
<u>Навыки</u>	Отсутствие базовых	При решении стандартных	Имеется минимальн	Продemonстрированы	Продemonстрированы	Продemonстрированы	Продemonстрирован

	навыков. Невозможность оценить наличие навыков вследствие отказа обучающегося от ответа	задач не продемонстриро ваны базовые навыки. Имели место грубые ошибки	ый набор навыков для решения стандартны х задач с некоторым и недочетами	базовые навыки при решении стандартны х задач с некоторым и недочетами	базовые навыки при решении стандартны х задач без ошибок и недочетов	навыки при решении нестандарт ных задач без ошибок и недочетов	творческий подход к решению нестандартны х задач
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Scale of assessment for interim certification

Grade		Assessment criteria
pass	outstanding	All the competencies (parts of competencies) to be developed within the discipline have been developed at a level no lower than "outstanding", the knowledge and skills for the relevant competencies have been demonstrated at a level higher than the one set out in the programme.
	excellent	All the competencies (parts of competencies) to be developed within the discipline have been developed at a level no lower than "excellent",
	very good	All the competencies (parts of competencies) to be developed within the discipline have been developed at a level no lower than "very good",
	good	All the competencies (parts of competencies) to be developed within the discipline have been developed at a level no lower than "good",
	satisfactory	All the competencies (parts of competencies) to be developed within the discipline have been developed at a level no lower than "satisfactory", with at least one competency developed at the "satisfactory" level.
fail	unsatisfactory	At least one competency has been developed at the "unsatisfactory" level.
	poor	At least one competency has been developed at the "poor" level.

5.3 Model control assignments or other materials required to assess learning outcomes during the interim certification with the criteria for their assessment:

5.3.1 Model assignments (assessment tool - Essay) to assess the development of the competency ОПК-10

- How can computer discovery help in organization of doctor-patient cooperation*
- What fields of medicine do technological breakthroughs cover and why*
- What diagnostic method is used to get small sample of tissue with minimal pain? Explain your point of view.*
- Brain surgery, laparoscopic surgery and laser surgery are becoming more commonplace today, aren't they Explain your point of view.*
- Have modern medical technologies led to any problems in the modern world? Give the examples. Explain your point of view.*
- What is a negative influence of new medical technologies on people? Explain your point of view.**
- Breakthroughs in medicine from the point of view of medical informatics. Give the examples and explain.***
- Introduction in medical management. How to make the medical center? Step by step.**

- CT is the universal method in diagnostic. Agree or disagree. Explain your point of view.*
- Robotics in surgery always better than real doctors. Agree or disagree. Explain your point of view.*
- Ultrasonography as the universal method. Agree or disagree. Explain your point of view.*
- Telemedicine. What is a possible situation when it might be necessary to use? Explain your point of view.*
- Virtual reality never used in medicine. Agree or disagree. Explain your point of view.*

Assessment criteria (assessment tool — Essay)

Grade	Assessment criteria
pass	The proposed topic has been revealed
fail	Lack of knowledge

6. Учебно-методическое и информационное обеспечение дисциплины (модуля)

Основная литература:

1. Обмачевская С. Н. Медицинская информатика. Курс лекций / Обмачевская С. Н. - 4-е изд., стер. - Санкт-Петербург : Лань, 2022. - 184 с. - Книга из коллекции Лань - Медицина. - ISBN 978-5-507-44389-5., <https://e-lib.unn.ru/MegaPro/UserEntry?Action=FindDocs&ids=802723&idb=0>.
2. Danilova E.Yu. Guide to Medical Informatics for Foreign Students : учебное пособие / Danilova E.Yu.; Galkina E.N.; Glushkov S.V. - Москва : ГЭОТАР-Медиа, 2022. - 272 с. - ISBN 978-5-9704-6898-2., <https://e-lib.unn.ru/MegaPro/UserEntry?Action=FindDocs&ids=808170&idb=0>.
3. compiled b. S. Medical informatics for medical school students in EnglishL: lecture course / compiled b. S., Popova N. M. - Ижевск : ИГМА, 2020. - 56 с. - Книга из коллекции ИГМА - Медицина., <https://e-lib.unn.ru/MegaPro/UserEntry?Action=FindDocs&ids=804840&idb=0>.
4. J. Mantas. Informatics and Technology in Clinical Care and Public Health. - IOS Press, 2022. - 1 online resource. - ISBN 9781643682518. - ISBN 9781643682501. - Текст : электронный., <https://e-lib.unn.ru/MegaPro/UserEntry?Action=FindDocs&ids=856435&idb=0>.

Дополнительная литература:

1. Research Anthology on Medical Informatics in Breast and Cervical Cancer. - IGI Global, 2022. - 1 online resource. - ISBN 9781668471371. - ISBN 9781668471364. - Текст : электронный., <https://e-lib.unn.ru/MegaPro/UserEntry?Action=FindDocs&ids=856296&idb=0>.
2. Danilova E.Yu. Guide to Medical Informatics for Foreign Students : учебное пособие / Danilova E.Yu.; Galkina E.N.; Glushkov S.V. - Москва : ГЭОТАР-Медиа, 2022. - 272 с. - ISBN 978-5-9704-6898-2., <https://e-lib.unn.ru/MegaPro/UserEntry?Action=FindDocs&ids=808170&idb=0>.

Программное обеспечение и Интернет-ресурсы (в соответствии с содержанием дисциплины):

Пакет MS Office 2007

Статистика в среде R

<http://elibrary.ru> – научная электронная библиотека

<http://www.femb.ru/feml> - Федеральная электронная медицинская библиотека
<http://www.armit.ru/> - Ассоциация развития медицинских информационных технологий.
<https://telemedicina.ru/> - портал посвященный проблемам телемедицины
<http://www.medstatistic.ru/> - портал по медицинской статистике
http://kingmed.info/knigi/Meditsinskaya_informatika_i_biostatistika – книги по медицинской информатике и биостатистике

Информатика, медицинская информатика, статистика: учебник / В. П. Омельченко, А. А. Демидова. - Москва: ГЭОТАР-Медиа, 2021. - 608 с. - Режим доступа:

<https://www.studentlibrary.ru/book/ISBN9785970459218.html>

Медицинская информатика [Электронный ресурс]: учебник / под общ. ред. Т.В. Зарубиной, Б.А. Кобринского. - М.: ГЭОТАР-Медиа, 2018. - 512 с - Режим доступа:

<https://www.studentlibrary.ru/book/ISBN9785970445730.html>

Биоинформатика: учебник [Электронный ресурс] / Н. Ю. Часовских. - Москва : ГЭОТАРМедиа, 2020. - 352 с. с ил. - Режим доступа:

<https://www.studentlibrary.ru/book/ISBN9785970455425.html>

Handbook of Informatics for Nurses & Healthcare Professionals

Author: by Toni Hebda

Published at: Pearson; 6th edition (July 24, 2018)

ISBN: 978-0134711010

Health Care Information Systems: A Practical Approach for Health Care Management

Author: by Karen A. Wager

Published at: Jossey-Bass; 4th edition (March 27, 2017)

ISBN: 978-1119337188

Informatics and Nursing

Author: by Jeanne Sewell

Published at: LWW; 6th edition (October 25, 2018)

ISBN: 978-1496394064

7. Материально-техническое обеспечение дисциплины (модуля)

Учебные аудитории для проведения учебных занятий, предусмотренных образовательной программой, оснащены мультимедийным оборудованием (проектор, экран), техническими средствами обучения, компьютерами.

Помещения для самостоятельной работы обучающихся оснащены компьютерной техникой с возможностью подключения к сети "Интернет" и обеспечены доступом в электронную информационно-образовательную среду.

Программа составлена в соответствии с требованиями ФГОС ВО по направлению подготовки/специальности 31.05.01 - General Medicine.

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