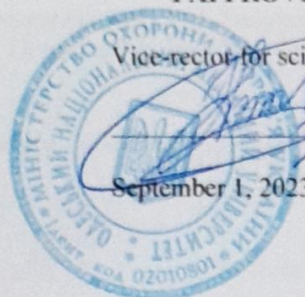


MINISTRY OF HEALTH PROTECTION OF UKRAINE

ODESSA NATIONAL MEDICAL UNIVERSITY

Department of general and clinical epidemiology and biosafety

I APPROVE



Vice-rector for scientific and pedagogical work

Eduard BURIACHKIVSKYI

September 1, 2023

**WORKING PROGRAM OF EDUCATIONAL DISCIPLINE
"BASICS OF SCIENTIFIC RESEARCH IN MEDICINE"**

Level of higher education: second (master's)

Branch of knowledge: 22 "Health care"

Specialty: 222 "Medicine"

Educational and professional program: Medicine

2023

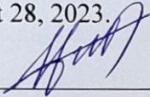
The work program is compiled on the basis of the educational and professional program "Medicine" for the training of specialists of the second (master's) level of higher education in the specialty 222 "Medicine" of the field of knowledge 22 "Health care", approved by the Scientific Council of ONMedU (protocol No. 8 of June 29, 2023).

Developers:

head of the department, Prof., Doctor of Medicine, M.I. Golubyatnykov
 professors of the department, Doctor of Medicine, O.V. Bachynska
 associate professor of the department: PhD T.V. Fedorenko
 assistants to prof.: PhD T.V. Gerasimenko, PhD O.A. Melnyk, K.S. Hrytsenko

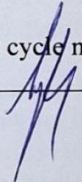
The work program was approved at the meeting of the department of general and clinical epidemiology and biosafety

Protocol No. 1 dated August 28, 2023.

Head of the department  Mykola GOLUBYATNYKOV

Agreed with the guarantor of the OPP  Valery MARICHEREDA

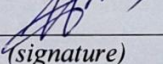
Approved by the subject cycle commission for medical and biological disciplines of ONMedU
 Protocol No. ___ of "___" _____ 2023.

Head of the subject cycle methodical commission for medical and biological disciplines of
 ONMedU  Leonid GODLEVSKYI

Reviewed and approved at the meeting of the department

of general and clinical epidemiology and biosafety with course of microbiology and virology

Protocol No. 1 of "1" September 2023

Head of the department  Mykola GOLUBYATNYKOV
 (signature) (First Name Surname)

Reviewed and approved at the meeting of the department

Protocol No. ___ of "___" _____ 20__

Head of Department _____
 (signature) (First Name Surname)

1. Description of the academic discipline:

Name of indicators	Field of knowledge, specialty, specialization, level of higher education	Characteristics of the academic discipline	
The total number of: Credits - 3 Hours - 90 Content subdivisions - 1	Branch of knowledge 22 "Health care"	<i>Full-time education</i>	
		<i>Elective discipline</i>	
	Specialty 222 "Medicine"	<i>A year of training</i>	3
		<i>Semester</i>	V-VI
	Level of higher education second (master's)	<i>Lectures</i>	0
		<i>Practical</i>	30 hours
		<i>Independent work</i>	60 hours
		<i>Including individual tasks</i>	0
	<i>Final control form</i>	Test	

2. The purpose and tasks of the educational discipline, competences, program learning outcomes.

Goal: formation of a system of methodological knowledge, abilities and skills in the acquirers the field of organization and conduct of scientific research in health care.

Task:

- familiarization with the basics of knowledge of methodology, methods and concepts of scientific research;
- formation of practical skills and abilities to apply the methodology of scientific methods, as well as development of projects and programs for conducting scientific research;
- education of moral qualities and ethical norms in the process of scientific research research.
- summarize research materials.

The process of studying the discipline is aimed at forming elements of the following competencies:

IR. The ability to solve typical and complex problems, including those of a research and innovation nature in the field of medicine. Ability to continue learning with a high degree of autonomy.

- General (GC):

- GC1. Ability to abstract thinking, analysis and synthesis
- GC3. Ability to apply knowledge in practical situations
- GC4. Knowledge and understanding of the subject area and understanding of professional activity
- GC5. Ability to adapt and act in a new situation
- GC6. Ability to make informed decisions
- GC7. Ability to work in a team
- GC8. Ability to interpersonal interaction
- GC10. Ability to use information and communication technologies
- GC11. Ability to search, process and analyze information from various sources
- GC16. The ability to evaluate and ensure the quality of the work performed

Special (SK):

- SC18. The ability to analyze the activity of a doctor, unit, health care institution, ensure the quality of medical care and increase the efficiency of the use of medical resources
- SC21. The ability to clearly and unambiguously convey one's own knowledge, conclusions and arguments on health care problems and related issues to specialists and non-specialists, in particular to people who are studying
- SC23. Ability to develop and implement scientific and applied projects in the field of health care
- SC25. Adherence to professional and academic integrity, to be responsible for the reliability of the obtained scientific results

Program learning outcomes (PLO):

PLO1. Have thorough knowledge of the structure of professional activity. To be able to carry out professional activities that require updating and integration of knowledge. To be responsible for professional development, the ability for further professional training with a high level of autonomy.

PLO2. Understanding and knowledge of fundamental and clinical biomedical sciences, at a level sufficient for solving professional tasks in the field of health care.

PLO3. Specialized conceptual knowledge, which includes scientific achievements in the field of health care and is the basis for conducting research, critical understanding of problems in the field of medicine and related interdisciplinary problems.

PLO21. Search for the necessary information in the professional literature and databases of other sources, analyze, evaluate and apply this information.

PLO25. It is clear and unambiguous to convey one's own knowledge, conclusions and arguments on health care problems and related issues to specialists and non-specialists.

PLO22. Apply modern digital technologies, specialized software, statistical methods of data analysis to solve complex healthcare problems

As a result of studying the academic discipline, the student of higher education must:

Know:

- methodological bases and criteria for choosing the main adequate methods of analysis for testing of scientific hypotheses;
- theoretical and methodical bases of analysis of statistical results, their evaluation and description for the purpose of forming reasonable conclusions
- standard procedures for processing medical information
- to know and have the skills of observation and analysis of social phenomena, study and summarize research results;
- to determine the actual research problem, its goals and tasks;
- formulate a hypothesis;
- conduct a scientific experiment;
- process and interpret the results of the conducted research;

Master the skills:

- conducting scientific research;
- processing and analysis of received scientific results;
- formulate reasonable conclusions;

3. Content of the academic discipline:

Content module I. Basics of scientific research in medicine.

Topic 1. Science and its role in society

Definition of science, classification of sciences, main features of modern science, history of the development of science. The main approaches to defining the concepts of "science", "scientific knowledge". Distinguishing features of science. Science as a system. The process of development of science. The goal and task of science. Subject and object of science. Concept of methodology of scientific knowledge. Level of methodology. Method, method and methodology. General scientific and philosophical methodology of essence, general principles. Classification of general scientific methods of cognition. Generally logical, theoretical and empirical research methods.

Topic 2. Scientific information: search, accumulation, processing. Planning of research work.

Definition of the terms "information" and "scientific information". Basic requirements for scientific information. Sources of scientific information and their classification on various grounds. Information flows. Working with information sources. Peculiarities of working with the book. Formulation of the topic of scientific research. Criteria related to the topic of scientific research. Statement of the research problem, its stages. Determination of the purpose and objectives of the research.

Planning of scientific research. Interpretation of basic concepts. Plan and its types. Analysis of theoretical and experimental research.

Topic 3. Scientific research and its stages. General requirements for research work.

The goals and tasks of scientific research, their classification on various grounds. Basic requirements for scientific research. Forms and methods of scientific research. The theoretical level of research and its main elements. Experimental level of research and its features. Stages of research work. Correct organization of scientific research work. The structure of research work. Ways of writing text. Language and style. Designing tables, graphs, formulas, links. Preparation of essays and reports. Planning of scientific work in research institutes.

Topic 4. Methodology of scientific research:

The main stages of scientific research. The choice of the topic of scientific research by the applicant, factors determining the choice. Object and subject of research, determination of its purpose and tasks. Information support of the recipient's scientific work. Main sources of scientific information. Types of scientific publications. Types of educational publications. Systematization and analysis of scientific and educational information. Methods of reading scientific literature. Types of reading special literature (review, familiarization, searching, studying). The Internet as a source of scientific information. Library catalogs, their types. Electronic catalog and electronic library. Methods of information processing and storage. Traditional. and modern media.

Topic 5. Basics of preparing a scientific publication.

The structure of scientific work (purpose, scope and methods, results of own research, conclusions). Peculiarities of design of scientific works (presentation of data in tables, graphic images). Rules for creating references to sources of information, list of literature. Characteristics and modern classification of scientific articles. Methods of publishing articles in scientific and publishing journals. Definition and characteristics of the main types of errors that authors make when writing a scientific article.

Topic 6. Implementation of scientific research and its effectiveness in medicine.

The process of implementing scientific research and its stages. Effectiveness of scientific research. The main types of effectiveness of scientific research in medicine. Evaluation of research effectiveness.

Topic 7. Requirements for the language and design of scientific papers

Functional styles of modern Ukrainian literary language (colloquial, official-business, journalistic, scientific). Linguistic (lexical, grammatical, stylistic) features of scientific style. Requirements for the language of the applicant's scientific work. Editing of the applicant's scientific work. Methods of presentation of scientific material and its editing. Requirements for the technical design of scientific work (abbreviation of words and phrases, design of tables, graphs and bibliographic apparatus).

Topic 8. Methodological principles of determining the level of science in different countries of the world and in Ukraine.

At the turn of the century, the level of development of national systems of "science and technology" became one of the main factors that have a huge impact on the social and economic development of the countries of the world, their role and place in the world economy. In this connection, the study of the national scientific and technical systems of the countries of the world, the achieved level of their development in time and space is one of the important tasks of scientific research. The qualitative difference in the level of development of science in individual countries of the world is determined, in turn, by the peculiarities of historical, political, and socio-economic development, and also depends on the existing territorial, cultural and ethnic factors.

Topic 9. Statistical methods used to evaluate the results of scientific research.

Selective observation as a source of statistical information. Estimation of the probability of difference: Student's t-test, calculation method, its evaluation. Peculiarities of use on small samples. Student table. Statistical hypothesis testing for independent samples. Analysis of qualitative features. Conjugation tables. Chi-square criterion, its evaluation and practical application.

Topic 10. Structure and design of an essay, thesis.

Definition of the concepts "abstract", "diploma". The structure of educational and scientific work. Writing the text of a scientific paper. Methods of processing the content of scientific texts. Conceptual and terminological support of the study. Designing the results of scientific work. Order of text formation.

Topic 11. Design of scientific research.

Modern concept of epidemiology. Classification of epidemiological studies. Comparative characteristics of various types of research, assessment of the level of evidence of their results. Retrospective and prospective studies. Empirical studies (descriptive and analytical). Descriptive epidemiology: description of a single case and case series. Analytical epidemiological studies. Cohort and case-control studies. Design of epidemiological and clinical studies. Research ethics. Types of design. Types of control. Blinding of the study. Required sample size. Selection of the object and research units. Inclusion and exclusion criteria. Concepts of randomization and stratification. Methods of conducting epidemiological studies (case-control, cohort, randomized clinical studies) and methods of evaluating their results.

Topic 12. Criteria for evaluating the quality of research and its legal support.

Research quality criteria. Rights and responsibilities of the scientific supervisor. Peer review of research works. Report on work. Compilation of abstracts of the report. Preparation of scientific materials for publication in the press.

Topic 13. Documentary sources. Organization of reference and information activities.

Documentary sources of information. Information and search systems: definition, history of development.

Topic 14. Basics of scientific ethics and work organization.

Ethical principles of scientific activity. Basics of organization of scientific work. Plagiarism and anti-plagiarism.

Topic 15. Development of an innovative project.

The main component of the integral result of innovative activity of the Ukrainian Medical University is the results of scientific research and innovative activity. The organization and conduct of tenders is carried out by the tender commission created by the customer for the organization and conduct of tenders for the implementation of the National Development Program.

4. Structure of the academic discipline:

No	Topic name	Number of hours		
		total	software	IWS
1	Science and its role in society.	6	2	4
2	Scientific information search, accumulation, processing. Planning of research work.	6	2	4
3	Scientific research and its stages. General requirements for scientific and research work.	6	2	4
4	Methodology of scientific research	6	2	4
5	Basics of preparation of scientific publications	6	2	4
6	Implementation of scientific research and its effectiveness in medicine	6	2	4
7	Requirements for the language and design of the applicants' works.	6	2	4
8	Methodological principles of determining the level of science in different countries of the world and in Ukraine.	6	2	4
9	Statistical methods used to process scientific results. (arithmetic mean, Student's coefficient)	6	2	4
10	Structure and design of an essay, thesis.	6	2	4
11	Design of scientific research.	6	2	4
12	Criteria for evaluating the quality of research and its legal support.	6	2	4
13	Documentary sources. Organization of reference and information activities.	6	2	4
14	Basics of scientific ethics and work organization.	6	2	4
15	Development of an innovative project.	6	2	4
Total hours		90	30	60

5. Topics of lectures / seminars / practical / laboratory classes

5.1. Topics of lectures

Lectures are not provided.

5.2. Topics of seminar classes

Seminar classes are not provided.

5.3. Topics of practical classes

No	TOPIC	Number of hours
1	Science and its role in society.	2
2	Scientific information search, accumulation, processing. Planning of research work.	2
3	Scientific research and its stages. General requirements for scientific and research work.	2
4	Methodology of scientific research	2
5	Basics of preparation of scientific publications	2
6	Implementation of scientific research and its effectiveness in medicine	2
7	Requirements for the language and design of the applicants' works.	2
8	Methodological principles of determining the level of science in different countries of the world and in Ukraine.	2
9	Statistical methods used to process scientific results. (arithmetic mean, standard deviation)	2
10	Structure and design of an essay, thesis.	2
11	Design of scientific research.	2
12	Criteria for evaluating the quality of research and its legal support.	2
13	Documentary sources. Organization of reference and information activities.	2
14	Basics of scientific ethics and work organization.	2
15	Development of an innovative project.	2
total		30

5.4. Topics of laboratory classes

Laboratory classes are not provided.

6. Independent work of a student of higher education

No	TOPIC	hours
1	Science and its role in society.	4
2	Scientific information search, accumulation, processing. Planning of research work.	4
3	Scientific research and its stages. General requirements for scientific and research work.	4
4	Methodology of scientific research	4
5	Basics of preparation of scientific publications	4
6	Implementation of scientific research and its effectiveness in medicine	4
7	Requirements for the language and design of the applicants' works.	4
8	Methodological principles of determining the level of science in different countries of the world and in Ukraine.	4

9	Statistical methods used to process scientific results. (arithmetic mean, Student's coefficient)	4
10	Structure and design of an essay, thesis.	4
11	Design of scientific research.	4
12	Criteria for evaluating the quality of research and its legal support.	4
13	Documentary sources. Organization of reference and information activities.	4
14	Basics of scientific ethics and work organization.	4
15	Development of an innovative project.	4
In total		60

7. Teaching methods

Practical training: conversation, solving situational problems, practicing skills for working with medical documentation.

Independent work: independent work with the textbook, independent work with the bank of test tasks Step-2, independent solution of situational tasks.

8. Forms of control and assessment methods (including criteria for evaluating learning outcomes)

Current control: oral survey, testing, assessment of performance of practical skills, solution of situational tasks, assessment of activity in class.

Final control: balance

Evaluation of the current educational activity in a practical session:

- Evaluation of theoretical knowledge on the subject of the lesson:
 - methods: survey, solving a situational problem;
 - the maximum score is 5, the minimum score is 3, the unsatisfactory score is 2.
- Evaluation of practical skills and manipulations on the subject of the lesson:
 - methods: assessment of the correctness of the performance of practical skills
 - the maximum score is 5, the minimum score is 3, the unsatisfactory score is 2.

The grade for one seminar session is the arithmetic average of all components and can only have a whole value (5, 4, 3, 2), which is rounded according to the statistical method.

Current assessment criteria for practical training:

Rating	Evaluation criteria
Perfectly "5"	It is presented to the applicant when he shows deep, solid and systematic knowledge in the scope of the curriculum, answers all questions without mistakes, reasonably formulates conclusions, using the materials presented for the independent work of the applicant, competently and consistently, with knowledge of the methodology, completed practical work ; using scientific terms and concepts correctly.
Fine "4"	The acquirer reveals the main content of the educational material; gives incomplete definitions of concepts; admits inaccuracies in the use of scientific terms, vaguely formulates conclusions, performed practical work, but made minor mistakes during the research.
Satisfactorily "3"	The applicant reproduces the basic educational material, but makes significant mistakes when presenting it, gives simple examples, definitions of concepts are insufficient, characterizes general issues of social medicine.
Unsatisfactorily "2"	The applicant discloses the content of the educational material fragmentarily, makes gross mistakes in the definition of concepts and when using terminology, did not complete the practical work.

Credit is given to the applicant who completed all tasks of the work program of the academic discipline, took an active part in practical classes, completed and defended an individual assignment and has an average current grade of at least 3.0 and has no academic debt.

Assessment is carried out in the last lesson before the beginning of the examination session (with the tape system of learning. The grade for the assessment is the arithmetic average of all components on a traditional four-point scale and has a value that is rounded up to 2 (two) decimal places according to the statistical method.

9. Distribution of points received by students of higher education

The obtained average score for the academic discipline for applicants who have successfully mastered the work program of the academic discipline is converted from a traditional four-point scale to points on a 200-point scale, as shown in the table:

Conversion table of a traditional assessment into a multi-point scale

Traditional four-point scale	Multipoint 200-point scale
Excellent ("5")	185 - 200
Good ("4")	151 - 184
Satisfactory ("3")	120-150
Unsatisfactory ("2")	Below 120

A multi-point scale (200-point scale) characterizes the actual success of each applicant in learning the educational component. The conversion of the traditional grade (average score for the academic discipline) into a 200-point grade is performed by the information and technical department of the University.

According to the obtained points on a 200-point scale, the achievements of the applicants are evaluated according to the ECTS rating scale. Further ranking according to the ECTS rating scale allows you to evaluate the achievements of students from the educational component who are studying in the same course of the same specialty, according to the points they received.

The ECTS scale is a relative-comparative rating, which establishes the applicant's belonging to the group of better or worse among the reference group of fellow students (faculty, specialty). An "A" grade on the ECTS scale cannot be equal to an "excellent" grade, a "B" grade to a "good" grade, etc. When converting from a multi-point scale, the limits of grades "A", "B", "C", "D", "E" according to the ECTS scale do not coincide with the limits of grades "5", "4", "3" according to the traditional scale. Acquirers who have received grades of "FX" and "F" ("2") are not included in the list of ranked acquirers. The grade "FX" is awarded to students who have obtained the minimum number of points for the current learning activity, but who have not passed the final examination. A grade of "F" is assigned to students who have attended all classes in the discipline, but have not achieved a grade point average (3.00) for the current academic activity and are not admitted to the final examination.

Applicants who study in one course (one specialty), based on the number of points scored in the discipline, are ranked on the ECTS scale as follows:

Conversion of the traditional grade from the discipline and the sum of points on the ECTS scale

Evaluation on the ECTS scale	Statistical indicator
A	Top 10% achievers
B	The next 25% of earners
C	The next 30% of earners
D	The next 25% of earners
E	The next 10% of earners

10. Methodological support:

- Working program of the academic discipline
- Syllabus of the academic discipline

- Multimedia presentations
- Situational clinical tasks
- Methodical developments for practical classes

11. Questions for final control:

1. Definition of science, purpose and tasks of science. The role and importance of science in the state science and technology policy.
2. Natural and scientific knowledge of the world. Criticism and struggle of opinions in science.
3. Classification of sciences. The main regularities of the development of science.
4. Structure of scientific knowledge, criteria of scientific knowledge. Classification of scientific knowledge. The concept of scientific methods. Theoretical, empirical, general methods.
5. Main components of theoretical knowledge. The structure of the empirical level of research.
6. Methodology of scientific research, classification of research types. Methodological principles of research. The main conceptual apparatus of scientific research.
7. Stages of the study of socio-economic processes. Methods of scientific research.
8. Logical scheme of scientific research. Structure and methodology of scientific research preparation.
9. Scientific and methodological publications.
10. Statistical methodology: definition, characteristics, possibilities.
11. Statistical methods of analysis. The task of statistical analysis of experimental data.
12. Basic indicators of descriptive (variational) statistics.
13. Computer packages for analysis of research results.
14. Methods of collecting social information. The importance of sociological research for improving the quality of medical care.
15. Sociological methods: observations, surveys, expert assessments.
16. Sociometric methods. Processing of medical and sociological information.
17. Modeling as a method of analyzing reality and forming development prospects.
18. Formalized and informal models. The importance of modeling in the development of health care.
19. The importance of scientific research on the development of medicine and health care.
20. Scientific achievements in various fields of medicine and possible perspectives.
21. Requirements for the culture, ethics and skill of a scientific researcher.
22. Requirements for the performance of scientific work. Requirements for the design of a scientific work.

12. Recommended literature

Main:

1. Basic Science Methods for Clinical Researchers. Davies, Sally Claire Німеччина, Elsevier Science, 2017.

Additional:

1. Research Methodology in the Medical and Biological Sciences. Нідерланди, Elsevier Science, 2007.
2. Understanding Medical Research: The Studies That Shaped Medicine. Велика Британія, Wiley, 2012.

13. Electronic information resources

- World Health Organization www.who.int
- Cochrane Center for Evidence-Based Medicine www.cebm.net
- Cochrane Library www.cochrane.org
- US National Library of Medicine - MEDLINE www.ncbi.nlm.nih.gov/PubMed
- Canadian Center for Evidence in Health Care www.cche.net
- Center for Disease Control and Prevention www.cdc.gov
- Public Health Center of the Ministry of Health of Ukraine www.phc.org.ua
- Ukrainian database of medical and statistical information "Health for all": <http://medstat.gov.ua/ukr/news.html?id=203>
- British Medical Journal www.bmj.com
- Journal of Evidence-Based Medicine www.evidence-basedmedicine.com