COURSE UNIT (MODULE) DESCRIPTION

Course unit (module) title	Code
Introduction to Scientific Research in Medicine and Evidence-Based Medicine	

Academic staff	Core academic unit(s)
Coordinating: Assoc. prof. Augustinas Bausys **Other:** Faculty Members of the Faculty of Medicine at Vilnius University	Vilnius University, Faculty of Medicine, Institute of Biomedical Sciences, Department of Pathology, Forensic Medicine, and Pharmacology, M.K. Čiurlionis St. 21, Vilnius

Study cycle	Type of the course unit
Integrated Studies (First and Second Cycle)	Mandatory

Mode of delivery	Semester or period when it is delivered	Language of instruction
Mixed learning methods: lectures (including remote) and seminars, small group discussions, and feedback provision. Independent study using designated learning resources.	4th semester	Lithuanian and English

Requisites	
Prerequisites: The student must have completed the course: Public Health and Health Management	**Co-requisites (if relevant):**

Number of ECTS credits allocated	Student's workload (total)	Contact hours	Individual work
3	81 h	40	41

Purpose of the course unit		
The aim of the program is to teach medical students to understand the principles of scientific research and the importance of science in the daily practice of a modern physician. The program develops four key competencies: 1. Understanding the principles of evidence-based medicine and their application in clinical medical practice; 2. Understanding different types of clinical biomedical research, their advantages and limitations in addressing a scientific question, and the ability to critically evaluate them; 3. Familiarizing with the significance of preclinical and translational research in medical science; 4. Acquiring basic skills necessary for planning and conducting clinical biomedical research.		
Learning outcomes of the course unit	**Teaching and learning methods**	**Assessment methods**
General Competencies		

Upon successful completion of this module, the student will be able to:		
Act honestly and ethically; be empathetic; think critically and self-critically; be creative; proactive, and goal-oriented; be able to communicate with others. Evaluate the limits of one's competencies and, when necessary, seek help; solve problems and make decisions; communicate and work as part of a team with professionals from other fields and experts from other sciences.	Seminars, case discussions, small group discussions, and independent work.	Continuous assessment during work seminars.
Subject-specific competencies Upon successful completion of this module, the student will be able to:		
• Understand the principles of evidence-based medicine and their application in clinical practice. • Know the types of biomedical research, understanding their advantages and limitations in answering scientific questions. • Be able to critically evaluate the results of medical and health science research. • Understand the need and importance of preclinical and translational research in medical science. • Be able to understand the main stages of conducting biomedical research.	Lectures (including remote), seminars and exercises, small group discussions, and feedback provision. Independent study. If necessary, key aspects of the topic are reviewed during the lectures. In seminars and exercises, conventional and problem-based learning methods are combined. Teaching materials (lecture notes, assignments, visual and textual materials) are provided in the electronic database at https://emokymai.vu.lt.	Ongoing Assessment of Theoretical Knowledge; Evaluation of Preparedness for the Seminar Topics and Participation Activity. A cumulative grading methodology (CG) is applied: CG = 70X% + 30Y% = 100%. X – Daily assessment during seminars, accounting for 70% of the final grade. Y – Final assessment (evaluation of independently completed student work), accounting for 30% of the final grade. A detailed evaluation is provided below.

Content	**Contact hours**							**Individual work: time and assignments**	
	Lectures	Tutorials	Seminars	Workshops	Laboratory work	Internship	**Contact hours, total**	**Individual work**	**Tasks for individual work**

1. Research in medicine - Introduction			4				4	4	Prepare for the seminar. Read the recommended literature, review the provided visual materials. Be knowledgeable and able to discuss the following topics: • The development of medicine and health sciences. • Clinical decision-making, cognitive errors, and critical thinking in medicine. • The importance of medical science and evidence, and the challenges in modern medicine. • Key concepts and types of medical and health research. • The quality of science and its dimensions. • Translational research and medical innovations. • Patient-centered medicine and scientific research. • An overview of the research and innovation process.
2. Biomedical and Translational Research	2		4				6	6	Prepare for the seminar. Read the recommended literature, review the provided visual materials. Be knowledgeable and able to discuss the following topics: • The importance of translational and clinical research in modern medicine. • Types of preclinical and clinical studies, their advantages and disadvantages.

3. Evidence-Based Medicine	2		4				6	6	Prepare for the seminar. Read the recommended literature, review the provided visual materials. Be knowledgeable and able to discuss the following topics: • Principles of evidence-based medicine. • Application of the PICO method in medical literature search. • Principles of developing diagnostic and treatment guidelines, their advantages and disadvantages, and their application in daily medical practice. • Principles of critical appraisal of clinical studies: GRADE, bias, and its assessment tools.
4. Principles of Planning and Conducting Biomedical Research	2		4				6	6	Prepare for the seminar. Read the recommended literature, review the provided visual materials. Be knowledgeable and able to discuss the following topics: • The importance and key principles of biomedical research planning. • Development of a research protocol: main stages, principles, and requirements. • Methods and principles of study implementation and data collection.

									• Analysis of research data and interpretation of results. • Legal regulation and registration of preclinical and clinical studies.
5. Critical Appraisal of Medical Research	2		4				6	6	Prepare for the seminar and complete the assigned practical task – read publications presenting the results of clinical and preclinical studies. Read the assigned literature. Be knowledgeable and able to discuss the following topics: • Clarity of the research question. • Appropriateness of the study design. • Quality of selection and sampling. • Methodological reliability. • Quality of data analysis. • Validity of conclusions. • Bias and funding. • EQUATOR international initiative recommendations for scientific research reporting.
6. Scientific Research and Business	2						2	2	Read the recommended literature and review the provided visual materials.
7. Funding, Commercialization, and Intellectual Property of Scientific Research			4				4	5	Prepare for the seminar. Read the recommended literature, review the provided visual materials. Be knowledgeable and

									able to discuss the following topics: • Intellectual property of research results. Advantages and disadvantages of different models. • Planning research budgets and funding opportunities. • Forms of intellectual property protection. • Patent strategies. • Potential financial returns from scientific research.
8. Dissemination of Research Results and Academic Writing	2		4				6	6	Prepare for the seminar. Read the recommended literature, review the provided visual materials. Be knowledgeable and able to discuss the following topics: • Methods of disseminating research results. • Scientific publishing: scientific journals and their evaluation metrics. • Preparing a scientific article, typical structure of a publication. • Key principles of academic writing. • The process of scientific publishing. • Specifics of preparing scientific presentations and theses.
Total	12		28				40	41	

Assessment strategy	Weight %	Deadline	Assessment criteria
A cumulative grading methodology (CG) is applied:	X-70% Y-30%	The end of the 4th semester	X – Interactive Questions and Participation During the Seminar

CG = 70X% + 30Y% = 100%. X – Daily assessment during seminars, accounting for 70% of the final grade. Y – Final assessment (evaluation of independently completed student work), accounting for 30% of the final grade.			During the seminar, students will be presented with interactive questions (open-ended, multiple-choice, statement-argument type, or oral questions), which must be answered within the given time limit. If a student fails to respond within the designated time, the questions will no longer be accessible. A correctly answered question is awarded 1 point, while an incorrect or unanswered question receives 0 points. Additionally, seminar participation is assessed. If a student actively engages in discussions and demonstrates preparedness for the seminar, they receive 1 additional point; otherwise, they receive 0 points. Thus, during each seminar, a student can earn between 0 to 2 points. These points constitute 70% of the final grade. Y – Final Assessment of Academic Performance. The final assessment is based on an independently completed student assignment, which can be: a clinical or preclinical research proposal prepared according to the provided template, or a critical evaluation of a publication presenting a clinical or preclinical study, assessed according to the provided template. The evaluation of a clinical research proposal considers: the justification and clarity of the proposed research idea/hypothesis; the clarity of formulated objectives; the quality of the literature review and adherence to citation requirements; the overall completeness of the document, including language style, grammatical accuracy, formatting, etc.; the suitability of the proposed research design for addressing the scientific question. The evaluation of a critical assessment of a research study considers the student's ability to accurately and critically identify potential study limitations and their impact on the obtained results. This task is graded on a scale of 0 to 6 points, making up 30% of the final grade. Final Grade Calculation The final grade is determined using the cumulative grading (CG) methodology, applying the following formula: (X+Y)/2=Final grade (score)

Author (-s)	Publishing year	Title	Issue of a periodical or volume of a publication	Publishing house or web link
Required reading				
Robertson, David; Williams, Gordon H Chantilly	2016	Clinical and Translational Science: Principles of Human Research.	ISBN: 9780128021019	Elsevier Science & Technology
Schulz, Kenneth ; Grimes, David A	2018	Essential concepts in clinical research	ISBN: 9780702073946	Elsevier

Howick, Jeremy H	2011	The philosophy of evidence-based medicine	ISBN: 9781444342659	Willey
Dans, Antonio L; Dans, Leonila F; Silvestre, Maria Asuncion A Newark	2017	Painless Evidence-Based Medicine	ISBN: 9781119196266	Willey
Recommended reading				