

Study programme/ study programmes: Doctoral Academic Studies in Biomedical Sciences

Name of the course: METHODOLOGY OF SCIENTIFIC RESEARCH IN MEDICINE

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Course status: compulsory

Number of ESPB credit points: 15

Admission requirements: -

Aim of the course

Theoretical and practical introduction of students to the modern methodology of scientific research in quantitative and qualitative studies.

Outcome of the course

The student will acquire necessary skills in the methodology of scientific research that will allow for individual practice in scientific research. The student will be introduced to the methodology of qualitative and quantitative studies. Modern methodological drafts and current methodology practice will be presented during this course.

At the end of the course, the student will master the scientific research methodology and have capability to individually plan, investigate and solve scientific problem. The student will be able to convey every phase of research adequately, from definition of the problem, establishing aims and hypotheses, over selection of the instruments and adequate sampling, to the accurate data collection and processing. Students will be introduced to the specific aspects of research in several biomedical disciplines.

Course overview

Theoretical part

1. Scientific research: definition, manners of thinking and types of research;
2. Scientific research as a process: the 8 steps research process model;
3. Development of the theoretical and conceptual research frame;
4. Defining of the research problem: sources of research problems, steps in problem formulation, formulations of research problems in quantitative and qualitative studies;
5. Variables in scientific research, types of variables and levels of measurements;
6. Scientific hypotheses: definition, function and testing of hypothesis; types of hypotheses in quantitative and qualitative studies;
7. Research draft: definition and function; modern drafts in quantitative and qualitative studies;
8. Methodology of data collection and data processing;
9. Validity and reliability of the chosen instrument in the quantitative and qualitative studies;
10. Sample in scientific research: term, aims, principles and types of study sampling; sample in quantitative and qualitative studies; power calculation of the sample size;
11. Models and significance of scientific communication;
12. Basic methodology of epidemiologic research;
13. Experimental research. Introduction to experimental methodology;
14. Experimental pharmacology;
15. Specificity of clinical scientific research;
16. Specificity of drug testing on humans;
17. Principles of good clinical practice. International recommendations for the conduction of biomedical research;
18. Research project, preparation and application. International collaboration and research projects;
19. PhD thesis – from application to the defense. PhD thesis defense, applications forms and documents.
20. Presentation and publication of results.
21. Categorization of the scientific work. Bibliometry. Curriculum vitae.
22. Education of young researchers. Mentorship.

Practical teaching

Skills in research definition and choosing complete theoretical and methodological frame of the research. Defining the problem and themes, aims and hypotheses of the scientific research. Skills in choosing and creation of appropriate research instruments, control of reliability and validity of the research instruments. Presentation of different quantitative and qualitative studies and significance in medicine and beyond. Power calculation of the study sample and choosing appropriate study population. Methodology of epidemiologic research. Laboratory animals: division, specificity and criteria for the experimental work.

Experimental pharmacology. Clinical research in human medicine. Analysis of the various examples of research types. Vancouver rules. Scientific research evaluation. Bibliometry. CV.

Literature

Obligatory

1. Kumar, R. (2019). *Research methodology: A step-by-step guide for beginners*. Sage Publications Limited.

Additional

1. Laake, P., Benestad, H. B., & Olsen, B. R. (Eds.). (2007). *Research methodology in the medical and biological sciences*. Academic Press.
2. Supino, P. G., & Borer, J. S. (Eds.). (2012). *Principles of research methodology: A guide for clinical investigators*. Springer Science & Business Media.
3. Rapport, F. (Ed.). (2004). *New qualitative methodologies in health and social care research*. Routledge.

Number of active classes	Theory: 60	Practice: 45
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Methods of the course

Lectures, seminars, practical teaching (workshops)

Final assessment (maximal number of points 100)

activity during lectures: 10

practical teaching: 20

seminar(s): 20

written examination: 50