DESCRIPTION OF COURSE UNIT FOR DOCTORAL STUDIES AT VILNIUS UNIVERSITY

Scientific Area/eas, Field/ds of Science	Medical and Health Sciences (M 000): Public Health (M 004)			
Faculty, Institute, Department/Clinic	Vilnius University Faculty of Medicine, Institute of Health Sciences, Department of Public Health			
Course unit title (ECTS credits, hours)	**Epidemiological Research Planning and Data Analysis** 6 credits (162 hours)			
Study method	**Lectures**	**Seminars**	**Consultations**	**Self-study**
Number of ECTS credits	0,5	1	1	3,5
Method of the assessment (in 10 point system)	Presentation and evaluation of the report The report is presented on a target topic, which is coordinated with the coordinating lecturers (the doctoral student must present a report on the specified topic or/and analyse, review and present the latest scientific publications related to the target topic). The completeness and quality of the report, theoretical knowledge of the doctoral student, ability to analyse and interpret scientific literature are evaluated.			

PURPOSE OF THE COURSE UNIT

Get to know the main groups of epidemiological indicators, types of epidemiological research, gain competence in planning epidemiological research, data analysis and interpretation, application of epidemiology knowledge in public health practice.

THE MAIN TOPICS OF COURSE UNIT

Epidemiological research, the purpose of epidemiological research, main research questions, the most important problems of analytical epidemiological research. Principles of epidemiological hypothesis formulation. Principles of selection of types of epidemiological studies. Research protocol, its components and their content. Design principles for retrospective and prospective cohort studies. Principles of designing a case-control study. Principles of subject selection criteria. Good epidemiological practice recommendations. Principles of the Declaration of Helsinki. Basic issues of a person's informed consent. Principles of critical evaluation of a scientific article. Principles of a systematic review of the epidemiological literature. Critical appraisal of cohort study articles. Critical appraisal of case-control research articles. Critical evaluation of articles using the research survey method. Principles of critical evaluation of clinical trial articles. Principles of conducting research. Data collection instruments. Principles of determining exposure and its indicators. Occupational exposure and its evaluation problems. Characterization of diagnostic tests: validity and reliability of method results. Method sensitivity, specificity, prognostic value of the result, interdependence of method sensitivity and specificity, relationship between prognostic value and disease prevalence. Bayes theorem. Likelihood relationships. ROC curve. Research quality assurance and control. Stages of quality assurance. The representativeness of the research results and the factors determining it. Non-probability sampling techniques. Pros and cons. Probability samples and their description. Simple random: returned, non-returned, systematic. Stratified sample. Nested sampling, effects of "planning", methods of nested sampling, determination of suitable population size, determination of nest size and number, selection of nests, advantages of nested sampling. Multilevel and multiphase sampling. Determination of study sample and power. Basic assumptions

for sample size calculation. Strategies (methods) for calculating the research sample. Determining the research sample: to estimate population parameters (proportion, mean, their difference), case-control and cohort studies. Accuracy, reliability, validity of research results. Internal and external validity. Methods of increasing the accuracy of research results. Causal generalization and systematic errors. Problems of causal generalization. Systematic errors leading to deviation of the result (association). Selection and information errors. The effect of healthy workers and ways to reduce it. The healthy worker effect in case-control and prevalence studies. Informational differential and non-differential errors. Control of systematic errors (the effect of bias and confounding factors on the results). The most important methods of managing selection and information errors. Control of systematic errors by research design: selection of research population, methods of information collection. Confounding factors and confounding effects. Methods of controlling confounding factors. Stages of assessment of confounding factors and effect modification. Control of confounding factors by restriction. Randomization. Control of confounding factors by pairing method. Advantages and disadvantages of this method. Principles of paired study data analysis. Stratified analysis. Standardization, its significance in epidemiological studies. Direct and indirect standardization. Standardized rates ratio (SSR). Standardized Incidence (Mortality) Ratio (SMR). Stages of data analysis: editing, description, evaluation, interpretation of results. Data preparation for analysis. Analysis plan (give an example), description of data, principles of forming research groups, meaning of descriptive statistics. Choosing the right statistical test. Applications of regression in epidemiology. A classic multiple regression model. Logistic regression model. Regression diagnostics. Cox proportional hazards model. Poisson regression model.

RECOMMENDED LITERATURE SOURCES

1. Introduction to epidemiologic research methods in public health practice / Susan Bailey and Deepa Handu. - Burlington: Jones & Bartlett Learning, 2013.
2. Gordis Epidemiology. David Celentano, Moyses Szklo; 6th Edition , Elsevier, 2018,
3. Modern Epidemiology. Timothy L. Lash , Tyler J. VanderWeele , Sebastien Haneuse, Kenneth J. Rothman, Wolters Kluwer, 2020.
4. Epidemiology: Study Design and Data Analysis, 3rd Ed./Mark Woodward.2013
5. Venclovienė J. Statistiniai metodai medicinoje Kaunas, Vytauto Didžiojo universitetas, 2010
6. National Academy of Sciences. Reference Manual on Scientific Evidence.3rd ed., 2011. http://www.fjc.gov/public/pdf.nsf/lookup/SciMan3D01.pdf/$file/SciMan3D01.pdf
7. Trochim, W. M. The Research Methods Knowledge Base, 2nd Edition. Internet WWW page, at URL: <http://www.socialresearchmethods.net/kb
8. Oxford Textbook of Public Health. R.Detels, QA.Karim, F Baum, L.Li, AH. Leyland, 7-th ed. Oxford University Press, 2021
9. Schoenbach V.J., Rosamond W.W. Understanding the Fundamentals of Epidemiology an evolving text. http://www.epidemiolog.net/evolving/FundamentalsOfEpidemiology.pdf
10. Oxford Handbook of Medical Statistics (2 ed.), Janet L.Peacock, Phil J.Peacock, Oxford University Press, 2020.

CONSULTING LECTURERS

1. <u>Coordinating lecturer</u>: Giedrė Smailytė (Assoc. Prof. Dr.).

2. Aušvydas Patašius (Assoc. Prof. Dr.).

3. Loreta Ašoklienė (Assist. Prof. Dr.).

APPROVED:

By Council of Doctoral School of Medicine and Health Sciences at Vilnius University: 29th of September 2022

Chairperson of the Board: Prof. Janina Tutkuvienė