



COURSE UNIT (MODULE) DESCRIPTION

Course unit (module) title	Code
Biochemical analysis methods in pharmacy	

Lecturer(s)	Department(s) where the course unit (module) is delivered
Coordinator: Anton Popov Other(s):	Faculty of Chemistry and Geosciences, Institute of Chemistry Naugarduko str. 24, LT-03225 Vilnius

Study cycle	Type of the course unit (module)
Second	Optional

Mode of delivery	Period when the course unit (module) is delivered	Language(s) of instruction
Face to face	2 nd semester	Lithuanian

Requirements for students	
Prerequisites: main courses of analytical chemistry, biochemistry, inorganic chemistry, organic chemistry and physical chemistry.	Additional requirements (if any):

Course (module) volume in credits	Total student's workload	Contact hours	Self-study hours
5	135	48	87

Purpose of the course unit (module): programme competences to be developed

The purpose of course is to develop:

- critical and analytical thinking.
- theoretical basis of biochemical methods using for quantitative and qualitative determination of pharmaceutical compounds.
- theoretical basis of pharmaceutical compounds determination using direct and indirect immunological analytical methods.
- theoretical basis for selection of the most appropriate biochemical analysis method of specific pharmaceutical compound determination in practice.

Learning outcomes of the course unit (module)	Teaching and learning methods	Assessment methods
Student will be able to analyze, systemize and critically evaluate scientific information about the newest biochemical analysis methods in pharmacy.	Problem-based learning Seminar discussion Independent study during preparation for seminar	Seminars/Final exam
Student will be able to apply acquiring knowledge in practice for solving of emerging problems in analysis of specific pharmaceutical compound using enzymes and immunoglobulins.	Problem-based learning Seminar discussion Independent study during preparation for seminar	Seminars/Final exam
Student will be able to select the most appropriate method of biomolecules immobilization on surface.	Problem-based learning Seminar discussion Independent study during preparation for seminar	Seminars/Final exam
Student will be able to apply electrochemical, acoustic and surface plasmon resonance methods for determination of pharmaceutical compounds.	Problem-based learning Seminar discussion Independent study during	Seminars/Final exam

	preparation for seminar	
Student will be able to evaluate practical applications of surfaces modified by molecular imprints or biologically active molecules and advantages and disadvantages of those methods.	Problem-based learning Seminar discussion Independent study during preparation for seminar	Seminars/Final exam
Student will be able to evaluate and compare advantages and disadvantages of direct and indirect determination of pharmaceutical compounds by immunological methods.	Problem-based learning Seminar discussion Independent study during preparation for seminar	Seminars/Final exam
Student will be able to evaluate advantages of nanomaterials usage in determination of pharmaceutical compounds.	Problem-based learning Seminar discussion Independent study during preparation for seminar	Seminars/Final exam

Content: breakdown of the topics	Contact hours					Total contact hours	Self-study hours	Self-study work: time and assignments
	Lectures	Seminars	Exercises	Laboratory work	Internship/work placement			Assignments
1. Introduction. Main biochemical methods using for determination of pharmaceutical compounds. Basic definitions. Direct and indirect analytical methods. Sample preparation.	4	2				6	3	Literature study, preparation for seminar
2. Spectrophotometric methods using for determination of pharmaceutical compounds.	4	2				6	8	Literature study, preparation for seminar
3. Enzymes. The mechanism of enzymatic action. Determination of enzyme activity. Opportunities to use enzymes in analysis.	4	2				6	8	Literature study, preparation for seminar
4. Antibodies. Specific antigen/antibody interaction. Polyclonal and monoclonal antibodies in analysis.	2	1				3	4	Literature study, preparation for seminar
5. Enzyme-linked immunosorbent assay (ELISA). Theoretical basis. ELISA Formats. Assay technique. Practical application.	2	1				3	4	Literature study, preparation for seminar
6. Enzymatic and affinity biosensors. Theoretical basis.	2	1				3	4	Literature study, preparation for seminar
7. Methods of biomolecules immobilization.	2	1				3	4	Literature study, preparation for seminar
8. Enzyme-based electrochemical biosensors and their application in determination of pharmaceutical compounds.	2	1				3	4	Literature study, preparation for seminar
9. Acoustic biosensors and their application in determination of pharmaceutical compounds.	2	1				3	4	Literature study, preparation for seminar
10. Surface plasmon resonance biosensors and their application in	2	1				3	4	Literature study, preparation for seminar

determination of pharmaceutical compounds.								
11. Molecular imprints and capillary electrophoresis in determination of pharmaceutical compounds. Theoretical basis and practical application.	4	2				6	8	Literature study, preparation for seminar
12. Opportunities to use nanomaterials in determination of pharmaceutical compounds.	2	1				3	4	Literature study, preparation for seminar
Preparation for oral presentation							8	
Preparation for the exam. Passing of exam.							20	
Total	32	16				48	87	

Assessment strategy	Weight,%	Deadline	Assessment criteria
Presentation	20	During semester	Presentation (Oral). Evaluation criteria: clear presentation illustrated with pictures, schemes and graphs by providing the newest information in form of PowerPoint slides; ability to answer questions; participation in the scientific discussion.
Final exam	80	During the examination session	5 - 8 questions (oral).

Author	Year of publication	Title	Issue of a periodical or volume of a publication	Publishing place and house or web link
Compulsory reading				
Ross L. Stein	2011	<u>Kinetics of Enzyme Action: Essential Principles for Drug Hunters</u>		Wiley Online Library
D. Wild (ed.)	2013	The Immunoassay Handbook: Theory and applications of ligand binding, ELISA and related techniques	4th Edition.	Elsevier Science.
Optional reading				
V. Laurinavičius	2012	Biocheminiai analizės metodai		Vilnius University Press
J. Kadziauskas	2008	Biochemijos pagrindai		Vilnius University Press