



COURSE UNIT (MODULE) DESCRIPTION

Course unit (module) title	Code
GENOTOXICOLOGY	

Lecturer(s)	Department(s) where the course unit (module) is delivered
Coordinator: prof. Juozas Lazutka (4 hrs) – lectures Other(s): doc. Veronika Dedonytė (16 hrs – lab. works) j.assist. Milda Babonaitė (44 hrs.) – (12 hrs – lectures, 12 hrs seminars, 12 hrs – exercises, 8 hrs – lab. works)	Institute of Biosciences, Life Sciences Centre, Vilnius University, Saulėtekio al. 7, LT-10257 Vilnius

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

Mode of delivery	Period when the course unit (module) is delivered	Language(s) of instruction
Lectures, seminars, exercises, labwork	2nd Semester (spring)	English/Lithuanian

Requirements for students	
Prerequisites: Basic genetics; Biochemistry; Organic chemistry;	Additional requirements (if any):

Course (module) volume in credits	Total student's workload	Contact hours	Self-study hours
5	134	64	70

Purpose of the course unit (module): programme competences to be developed		
In-depth knowledge about genotoxic properties, occurrence and biotransformation of substances already existing in nature or those that can be newly introduced into environment. Ability to apply this knowledge in independent scientific study		
Learning outcomes of the course unit (module)	Teaching and learning methods	Assessment methods
Upon the successful completion of this course, students will acquire: <ul style="list-style-type: none"> • knowledge on current achievements in research of genotoxic properties of various substances; • knowledge about mode of action of different genotoxic substances, their metabolism and detoxication pathways; • laboratory skills to perform genotoxicity testing; • abilities to analyse and interpret genotoxicity testing results; • scientific communication skills. 	Combined teaching and learning methods: lectures, seminars and tutorials; problem based learning; investigative method (information search and filing, report arrangement and presentation) in small groups, self-study	Group presentation; individual presentation; written report; oral and written examination

Content: breakdown of the topics	Contact hours						Self-study work: time and assignments		
	Lectures	Tutorials	Seminars	Exercises	Laboratory work	Internship/work placement	Contact hours	Self-study hours	Assignments
1. The objective and short history of genetic toxicology. Mutagens and mutations. Chemical mutagens: classification, mechanisms of action, dose-response relationships. Metabolic transformation of chemical mutagens, phase I and phase II reactions. Mutagen detoxication. Metabolic activation systems.	4						4		
2. Genetic toxicology assays. Bacterial mutagenicity assays. Plant cell mutagenicity assays. Mammalian cell mutagenicity assays in vitro and in vivo. In vivo assays in germ cells. The use of transgenic organisms in mutation assays. Structure-activity relationship (SAR).			4		24		28	36	Self-study of e-materials and research papers, preparation of seminar presentations and labwork report
3. Genotoxicity testing strategies. Risk assessment. Good laboratory practice.	4			12			16		Self-study of e-materials and research papers, preparation of case analysis reports
4. Genotoxins in air, water, food. Antimutagens. Ecogenotoxicology			4				4	12	
5. Toxicogenomic. New directions of genotoxicity research.	4						4		
6. Genotoxicity studies in human populations. Prospective and retrospective epidemiological studies. Biomarkers. Biomarkers of exposure, effect and susceptibility. Application of biomarkers for human risk assessment. Mutagens and carcinogens. Ethical problems in genetic studies.			4				4	12	Self-study of e-materials and research papers, preparation of seminar presentations
7. Nanogenotoxicology	4						4		
8. Preparation to exam								10	
Total	16		12	12	24		64	70	

Assessment strategy	Weight, %	Deadline	Assessment criteria
Seminar presentation (groupwork)	20	During the term	For group work, all group members are given the same evaluation. 10 (excellent) - excellent, exceptional knowledge and abilities; 9 (very good) - very good knowledge and abilities; 8 (good) - knowledge and abilities are above average; 7 (average) - average knowledge and abilities; there are few not essential mistakes; 6 (satisfactory) - knowledge and abilities are below average, there are mistakes; 5 (weak) - knowledge and abilities meet the minimum requirements. 1 point penalty if presentation was made not in time. Zero points if presentation was not made.
Written report on genotoxicity testing of selected substance (groupwork)	20	During the term	For group work, all group members are given the same evaluation as described above. 1 point penalty if report was submitted not in time. Zero points if written report was not submitted.

Case analysis (written report, individual work)	20	During the term	Individual evaluation is given as described above. 1 point penalty if report was submitted not in time. Zero points if written report was not submitted.
Written/oral examination	40	During exam session	Exam will consist of four open questions. Evaluation based on 0-10 points scale will be used, separate marks for each answer will be given.
Total	100		Accumulative score. For group presentations, all group members are given the same evaluation. 10 (excellent) - excellent, exceptional knowledge and abilities, 91-100 percentile of the intended learning outcome; 9 (very good) - very good knowledge and abilities, 81-90 percentile of the intended learning outcome; 8 (good) - knowledge and abilities are above average, 71-80 percentile of the intended learning outcome; 7 (average) - average knowledge and abilities; there are few not essential mistakes, 61-70 percentile of the intended learning outcome; 6 (satisfactory) - knowledge and abilities are below average, there are mistakes, 56-60 percentile of the intended learning outcome; 5 (weak) - knowledge and abilities meet the minimum requirements, 51-55 percentile of the intended learning outcome; 4,3,2,1(insufficient) - the minimum requirements are not met, 0-50 percentile of the intended learning outcome. 5 additional points could be added due to activity during the seminars.

Author	Year of publication	Title	Issue of a periodical or volume of a publication	Publishing place and house or web link
Compulsory reading				
	2016	Overview of the set of OECD Genetic Toxicology Test Guidelines. OECD Environment, Health and Safety Publications. Series on Testing and Assessment No. 238		OECD, Paris
R. Proudlock (Ed.)	2016	Genetic Toxicology Testing A Laboratory Manual		Academic Press
Optional reading				
J. Lazutka.	2000	Genetinė toksikologija.		Vilniaus universiteto leidykla: Vilnius
M. J. Graziano, D. Jacobson-Kram (Eds.)	2015	Genotoxicity and Carcinogenicity Testing of Pharmaceuticals		Springer
A. Paulauskas, G. Slapšytė, V. Morkūnas	2003	Bendrosios genetikos tyrimų metodai ir pratybos		Vilnius: Inforastras