

<b>Study programme:</b> PhD in Biology			
<b>Level:</b> PhD degree			
<b>Course title:</b> Selected topics in Molecular Toxicology			
<b>Lecturer:</b> dr. Sonja Kaišarević			
<b>Status:</b> elective			
<b>ECTS:</b> 15			
<b>Requirements:</b>			
<b>Learning objectives</b> Gaining the knowledge in general principles of molecular and cellular mechanisms through which toxicants disturb cell homeostasis.			
<b>Learning outcomes</b> After successful completion of the course, student will be able to: - adopt basic terms and rules in molecular and physiological aspects of toxicology as multidisciplinary scientific branch; - describe and understand general principles of molecular mechanisms of action of toxicants and their physiological effects; - interpret contemporary scientific literature dealing with topics covered by this course; - create and perform selected <i>in vitro</i> toxicity tests on cell cultures that students will get familiar with during independent experimental work.			
<b>Syllabus</b> <i>Theoretical instruction</i> Introduction to toxicology. Multidisciplinary aspects of toxicology. Mechanistic toxicology. Classification and types of toxicants. Absorption, distribution, metabolism and elimination of toxicants. Membrane transporters. Molecular and physiological mechanisms of action of toxicants. Receptors and signalling pathways. Molecular mechanisms and regulation of induction of cytochrom P450 enzymes, and effect on cellular and physiological functions. Cytoprotective mechanisms – the role of antioxidative defence system. Physiological role and significance of biotransformation and cellular mechanisms of detoxification as mechanisms of adaptation. Markers of cellular toxicity. Markers in estimation of cytotoxic (necrotic and apoptotic) and proliferative effects of toxicants. Changes in cellular and physiological functions. Experimental models and molecular methods in toxicological research. <i>In vitro</i> and <i>in vivo</i> toxicity tests. Omic-technologies in toxicological investigations. <i>Practical instruction</i> Experimental work: students will perform selected <i>in vitro</i> cytotoxicity tests on cell cultures – planning, creating and performing the experiment, processing and presentation of the results. Presentation and discussion of the contemporary scientific results and publications connected to the topics covered by the theoretical part of the course.			
<b>Literature</b> 1) Group of authors: A Textbook of Modern Toxicology. Third edition. (2004) Edited by Ernest Hodgson. Published by John Wiley & Sons, Inc., Hoboken, New Jersey. 2) Group of authors: Principles of Toxicology. Second edition. (2000) Edited by P.L. Williams, R.C.James, S.M. Roberts. Published by John Wiley & Sons, Inc. 3) Radojicic R.M. General Ecophysiology. (2006) Zavod za udzbenike, Belgrade. 4) Reviews covering the topics of the course.			
<b>Weekly teaching load</b>			Other:
Lectures: 5	Exercises:	Other forms of teaching:	
<b>Teaching methodology</b> Interactive lectures, consultations, group discussions, experimental laboratory work, processing and presentation of the results.			
<b>Grading method (maximal number of points 100)</b>			
Pre-exam engagement (student research) – up to 50 points; Final exam (oral exam) – up to 50 points			