



УНИВЕРЗИТЕТ У БАЊОЈ ЛУЦИ  
UNIVERSITY OF BANJA LUKA  
ПРИРОДНО-МАТЕМАТИЧКИ ФАКУЛТЕТ  
FACULTY OF NATURAL SCIENCES AND MATHEMATICS



CHEMISTRY DEPARTMENT

PhD STUDIES

Course name	<b>Selected Chapters of Toxicological Biochemistry</b>			
Course code	Course status	Semester	Hours of instruction	ECTS
DHEM23OPT	elective	I, II, III or IV	5+0	10
Teacher(s)	<b>Prof. Biljana Davidović-Plavšić, PhD</b>			

Prerequisite course(s)	Entry requirements
/	/

Course goals
The aim of the course is to acquire and deepen knowledge about interactions between xenobiotics and the organism at the molecular level, ie biotransformation of xenobiotics, bioinactivation and interactions of xenobiotics with biomolecules (proteins and nucleic acids).

Learning outcomes
Understanding the process of biotransformation and bioinactivation of xenobiotics. Understanding the molecular aspects of the toxic effect, the structure and activity relationship of xenobiotics; and the biochemical basis of toxicity manifestation on target organs; familiarization with the basic methods and techniques used in toxicological biochemical laboratories (proteomics, metabolomics).

Course content
Thematic units <ol style="list-style-type: none"><li>Disposition of xenobiotics in the human organism. Absorption, distribution, and excretion of xenobiotics. Biotransformation. Toxicokinetics.</li><li>Metabolic reactions of xenobiotics. Phase I, Phase II biotransformation. Biochemical mechanisms of toxicity. Effect on enzymatic activity. Biochemistry of mutagenesis and carcinogenesis. Toxic effect of xenobiotics on nucleic acids.</li><li>Toxicity to target organs. Response mechanisms of individual organs: blood, liver, kidneys, and pancreas.</li><li>Toxic agents. Toxic effects of pesticides, metals, drugs, and plants.</li><li>Toxicology of reactive oxygen species. Subcellular sites of their generation are under the influence of xenobiotics. Lipid peroxidation. Enzyme inhibition and activation. Nucleic acid and protein damage. Defense against reactive oxygen species.</li><li>Enzyme systems that metabolize xenobiotics. Enzyme distribution. Regulation of their activity. Mechanism of catalysis.</li><li>Depending on the interest and research of the students, thematic units can include the impact of xenobiotics on other organisms (animals, plants).</li></ol>

Teaching methods
lectures, review of relevant literature

Books and other learning materials
Manahan, S. E. (2002). <i>Toxicological chemistry and biochemistry</i> . CRC Press. Hodgson, E. (Ed.). (2004). <i>A textbook of modern toxicology</i> . John Wiley & Sons. Ioannides, C. (Ed.). (2002). <i>Enzyme systems that metabolize drugs and other xenobiotics</i> . J. Wiley.

Course activities and grading method
Research work, final oral exam

Research work	40	Final oral exam	60
---------------	----	-----------------	----

Additional course notes
/

Name of the teacher who prepared this form	Biljana Davidović-Plavšić
--	---------------------------