

<b>Study Programme:</b> Biotechnology, Pharmaceutical Engineering, Chemical Engineering		
<b>Course Unit Title:</b> Bioprocess Engineering		
<b>Course Unit Code:</b> O5BO1		
<b>Name of Lecturer(s):</b> Associate Professor Bojana Bajić, Associate Professor Damjan Vučurović		
<b>Type and Level of Studies:</b> Bachelor Academic Degree		
<b>Course Status (compulsory/elective):</b> Compulsory		
<b>Semester (winter/summer):</b> Winter		
<b>Language of instruction:</b> English		
<b>Mode of course unit delivery (face-to-face/distance learning):</b> Face-to-face		
<b>Number of ECTS Allocated:</b> 6		
<b>Prerequisites:</b> None		
<b>Course Aims:</b> Acquisition of basic scientific and academic abilities and skills in the field of biochemical or bioprocess engineering theory, understanding of certain phases of bioprocesses as well as their interconnection.		
<b>Learning Outcomes:</b> Understanding the importance and role of biocatalysts, principles of nutrient media formulation, transfer phenomenon in bioprocesses and kinetics of basic reactions in bioprocesses, knowledge of the principles of selection of bioprocess product separations, development and scale-up of bioprocesses, importance and application of bioprocesses.		
<b>Syllabus:</b> <i>Theory</i> Definition, development, areas and structure of biotechnology and bioprocess engineering. Biocatalysts. Enzyme reaction kinetics. Microorganism growth kinetics. Metabolism regulation. Bioprocesses stoichiometry. Bioprocesses thermodynamics. Bioprocesses transfer phenomenon. Water preparation procedures in biotechnology. Types, substrates and preparation of nutrient media. Procedures, mechanism and kinetics of nutrient media, air and equipment sterilization. Measurements in biotechnology. Bioprocesses control and regulation. Product separation, purification and concentration. Bioprocess scale-up. Bioprocess modeling, control, simulation and optimization. Wastewater in biotechnology. <i>Practice</i> Computational exercises in the field of kinetics of enzymatic reactions and kinetics of growth of microorganisms, formulation of nutrient media, stoichiometry and thermodynamics of bioprocesses, transfer phenomenon in bioprocesses, kinetics of sterilization and scaling up of bioprocesses.		
<b>Required Reading:</b> 1. Shuler, Michael L.; Kargi, Fikret. Bioprocess Engineering: Basic Concepts (2 <sup>nd</sup> Edition). Prentice Hall, 2001. 2. Liu, Shijie. Bioprocess Engineering: Kinetics, Biosystems, Sustainability and Reactor Design. Elsevier, 2012. 3. Doble, Mukesh; Gummadi, Sathyanarayana N. Biochemical Engineering. Prentice Hall, 2010. 4. Tanveer, Syed; Inamdar, Ahmed. Biochemical Engineering: Principles and Concepts. Prentice Hall, 2008.		
<b>Weekly Contact Hours:</b> 6	<b>Lectures:</b> 3	<b>Practical work:</b> 3
<b>Teaching Methods:</b> Interactive lectures using video presentations, computational exercises, consultations.		
<b>Knowledge Assessment (maximum of 100 points):</b>		

<b>Pre-exam obligations</b>	points	<b>Final exam</b>	points
Active class participation		written exam	
Test I and Test II	40	oral exam	60
Preliminary exam(s)		.....	
Seminar(s)			

The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.