

<b>Study Programme:</b> Biotechnology		
<b>Course Unit Title:</b> Bioprocess Design		
<b>Course Unit Code:</b> O8BIO1		
<b>Name of Lecturer(s):</b> Associate Professor Damjan Vučurović, Associate Professor Bojana Bajić		
<b>Type and Level of Studies:</b> Bachelor Academic Degree		
<b>Course Status (compulsory/elective):</b> Compulsory		
<b>Semester (winter/summer):</b> Summer		
<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> Acquiring the necessary knowledge and skills for the design of new or reconstruction of existing bioprocessing plants. Mastering the basic tool of every engineer - the material balance.		
<b>Learning Outcomes:</b> Practical and theoretical understanding of the key elements for translating the idea of bioproducts into successful industrial production while maintaining the desired quality and quantity of the product, as well as maintaining the accompanying process documentation.		
<b>Syllabus:</b> <i>Theory</i> Basic concepts of design. Specifics of designing biotechnological processes. Phases and areas of design. Basics of process control and instrumentation. Thermodynamics and transfer phenomena in the design process. Bioprocess optimization. Mass and energy balance. Modeling and simulation of bioprocesses. Increasing the scale of the bioprocess (scale-up). Basic economic principles. Comparison of alternative bioprocess solutions. Bioprocess sustainability assessment. Identification of critical points of bioprocesses. <i>Practice</i> Computational and experimental exercises in the field of mass and energy balances. Computer exercises in the field of modeling and simulation of bioprocesses.		
<b>Required Reading:</b> 1. E. Heinzle, A. Biwer, C. Cooney: Development of Sustainable Bioprocesses: Modeling and Assessment, John Wiley & Sons, West Sussex, 2006. 2. U. Diwekar: Batch Processing: Modeling and Design, CRC Press, Taylor & Francis Group, Boca Raton, 2014. 3. S. Liu: Bioprocess Engineering: Kinetics, Biosystems, Sustainability and Reactor Design, Elsevier, Oxford, 2013. 4. Center for Chemical Process Safety: Guidelines for Process Safety in Bioprocess Manufacturing Facilities, John Wiley & Sons, New Jersey, 2011.		
<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 and experimental exercises, consultations.		
<b>Knowledge Assessment (maximum of 100 points):</b>		

<b>Pre-exam obligations</b>	points	<b>Final exam</b>	points
Active class participation	5	written exam	
Test I and Test II	40	oral exam	45
Practical work	10	.....	
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.