

Study Programme: Biotechnology, Pharmaceutical engineering		
Course Unit Title: Sustainable Bioprocesses		
Course Unit Code: DB6		
Name of Lecturer(s): Associate Professor Bojana Bajić, Associate Professor Damjan Vučurović		
Type and Level of Studies: Doctoral Academic Degree		
Course Status (compulsory/elective): Elective		
Semester (winter/summer): Winter/summer		
Language of instruction: English		
Mode of course unit delivery (face-to-face/distance learning): Face-to-face		
Number of ECTS Allocated: 10		
Prerequisites: None		
Course Aims: Acquisition of academic knowledge about the principles, technologies and design of sustainable industrial bioprocesses and biorefineries. Students will learn about comprehensive biorefinery concept that integrates the production of high-value chemicals, bulk chemicals, biofuels and energy, while optimizing resource use, increasing profitability and reducing waste.		
Learning Outcomes: Detailed understanding of the basic principles for the development of sustainable industrial bioprocesses with the aim of training students for independent scientific and professional work on solving practical and theoretical problems in the field.		
Syllabus: <i>Theory</i> Concept of sustainable industrial bioprocesses and biorefineries. Renewable energy. Bioprocess integration that includes energy supply and waste management. Design, management and control of complex plants/biorefineries. Analyses of the impact of production systems on the environment using quantitative, objective and scientifically based techniques of life cycle analysis. <i>Practice</i> Searching through scientific literature, processing, analysis and discussion of the latest knowledge in this field.		
Required Reading: 1. Edgard Gnansounou, Ashok Pandey: Life-Cycle Assessment of Biorefineries, Elsevier, 2017. 2. Debalina Sengupta, Ralph W. Pike: Chemicals from biomass: Integrating bioprocesses into chemical production complexes for sustainable development, CRC Press, 2013. 3. Sunggy Lee, Y.T. Shah: Biofuels and Bioenergy: Processes and Technologies, CRC Press, 2013. 4. Shang-Tian Yang: Bioprocessing for value-added products from renewable resources: New technologies and application, Elsevier Ltd, 2007.		
Weekly Contact Hours: 6	Lectures: 4	Practical work: 2
Teaching Methods: Interactive lectures and consultations in a group or independently depending on the number of students; computer work, use of the internet, creation and presentation of seminar.		

Knowledge Assessment (maximum of 100 points):			
Pre-exam obligations	points	Final exam	points
Active class participation		written exam	
Practical work		oral exam	50
Preliminary exam(s)		
Seminar(s)	50		
The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.			