

Study programme: Food Processing				
Type and level of study: Bachelor's degree (240 ECTS) – First cycle				
<b>Course title: Industrial microbiology</b>				
<b>Lecturer:</b> Prof. Leka Mandić, PhD, Ass. Prof. Vesna Đurović, PhD				
<b>Language of instruction:</b> English				
ECTS credits: 6				
Prerequisite:				
Semester: winter				
<b>Course objective</b> Acquisition of basic abilities and skills in the field of application of microorganisms for production purposes, understanding of cause-and-effect relationships between production properties of microorganisms and different stages of the biotechnological process, as well as an overview of the biotechnological process as a whole.				
<b>Learning outcomes</b> Understanding the importance and role of production microorganisms as biocatalysts, understanding the principles of maintaining the production strain; the principles of formulating nutrient media and the conditions of the biotechnological process; the ability to reason when choosing a bioseparation technique in order to extract or finalize bioproducts. Acquired knowledge in industrial microbiology is the basis for a successful understanding of processes in biotechnologies and enables successful management of the production of health-safe food and quality control of final products.				
<b>Course contents</b> Subject importance and tasks of industrial microbiology. Production microorganisms (prokaryotes and eukaryotes, archaeobacteria and eubacteria). Industrial strains and methods of their improvement. Growth and multiplication of production microorganisms. Technological bases of synthesis using microorganisms. Production based on the application of microorganisms. Biomass production of microorganisms. Application and production of enzymes (microorganisms as producers of enzymes important for industry). Application and production of amino acids. Production of antibiotics. Production of vitamins. Biotransformations (microbiological transformation of organic compounds and biochemical transformation of metals). Biotechnology of renewable raw materials. Application of microbiological biotechnology in the food and processing industry (production of nutritious proteins, processes in the dairy industry, canning of fruits and vegetables, yeasts and their fermentation products). Microbiological damage to metals and methods of their protection. Biological wastewater treatment and solid waste treatment (composting, bioconversion of plant raw materials, detoxification of xenobiotics).				
<b>Recommended reading</b> David B. Wilson, Hermann Sahn, Klaus-Peter Stahmann, Mattheos Koffas (editor). (2020): Industrial Microbiology; Nduka Okafor, Benedict C. Okeke (2018): Modern Industrial Microbiology and Biotechnology.				
<b>Hours of active teaching</b>				<b>Other classes</b>
Lectures: 2x15=30	Practicals 1x15=15	Other forms of teaching tutorials: 1x15	Individual work	
<b>Teaching methods</b> Lectures are held in classrooms and laboratories using modern devices and teaching aids. Laboratory and practical sessions involve individual student work. For term paper assignments, office hours are open for questions regarding the choice of topic and selection of relevant references.				
<b>Assessment (maximum points 100)</b>				
<b>Examination requirements</b>	<b>Points</b>	<b>Final examination</b>	<b>Points</b>	
Class participation	5	oral examination	55	
Practical sessions/tests	10	written examination	25	
Term paper assignments/homework	5	.....		
Project				
Other				
<b>Grading system</b>				
<b>Grade</b>	<b>ECTS</b>	<b>Description</b>		
<b>10</b>	<b>91-100</b>	Excellent		
<b>9</b>	<b>81-90</b>	Exceptionally good		
<b>8</b>	<b>71-80</b>	Very good		
<b>7</b>	<b>61-70</b>	Good		
<b>6</b>	<b>51-60</b>	Passing		
<b>5</b>	<b>≤50</b>	Failing		