

Course Unit Descriptor

Study Programme: Food Engineering; Biotechnology; Pharmaceutical Engineering; Chemical Engineering; Materials Engineering			
Course Unit Title: Extraction systems			
Course Unit Code: DZI19			
Name of Lecturer(s): Prof. Branislava Nikolovski, PhD; Assoc. Prof. Marija Radojković, PhD			
Type and Level of Studies: Doctoral Academic Studies			
Course Status (compulsory/elective): Elective			
Semester (winter/summer): Winter and Summer			
Language of instruction: English			
Mode of course unit delivery (face-to-face/distance learning): Face-to-face			
Number of ECTS Allocated: 10			
Prerequisites: Unit Operations I, Unit Operations II			
Course Aims: The aim of the course is to provide the student with the latest scientific knowledge and academic skills in the field of extraction, as a separation operation, as well as to be educated to design devices related to complex separation processes.			
Learning Outcomes: Expanded knowledge in the field of transmission, balance, material and heat transfer equilibrium, as well as students' capacity to calculate multi-component multistage devices from liquid-liquid and solid-liquid extraction.			
Syllabus: <i>Theory</i> Equilibrium correlations between phases liquid-liquid and solid-liquid; Simple and multipurpose extraction liquid-liquid; Simple and multipurpose extraction solid-liquid; Devices for multi-component extraction liquid-liquid; Devices for multicomponent extraction are solid-liquid; Continuous counter-current multi-stage liquid extraction equipment; Anti-skid multi-stage extraction devices solid-liquid. <i>Practice</i> Review of contemporary scientific and professional journals and publications, selection and use of valid information on different extraction systems. Study research works comprise the comparison of conventional and modern extraction techniques on selected examples.			
Required Reading: Geankoplis, Ch. J.: Transport Processes and Unit Operations, Prentice Hall, New Jersey, 1993. Handa, S. S., Khanuja, S. P. S. Longo, G., Rakesh, D. D.: Extraction Technologies for Medicinal and Aromatic Plants, International centre for science and high technology, Trieste, 2008. Martinez, J. L., Supercritical Fluid Extraction of Nutraceuticals and Bioactive Compounds, CRC Press, Taylor & Francis Group, New York, 2008. McCabe, W. L., Smith, J., Harriott, P.: Unit Operations of Chemical Engineering, McGraw-Hill, New York, 1993. Treybal, R. E.: Mass Transfer-Operations, McGraw Hill, Tokyo, 1981. Williams J. R., Clifford, A. A.: Supercritical Fluid Methods and Protocols Humana Press, Totowa, New Jersey, 2000.			
Weekly Contact Hours: 6	Lectures: 4	Practical work: 2	
Teaching Methods: Lectures and students group work			
Knowledge Assessment (maximum of 100 points):			
Pre-exam obligations	points	Final exam	points
Active class participation	10	oral exam	50
Seminar(s)	40		