Course Unit Descriptor

Study Programme: Doctoral Academic Studies in Biochemistry		
Course Unit Title: Natural products isolation and characterization		
Course Unit Code: DSB614		
Name of Lecturer(s): Associate professor Dejan Orčić		
Type and Level of Studies: PhD degree		
Course Status (compulsory/elective): Elective		
Semester (winter/summer): Winter		
Language of instruction: English		
Mode of course unit delivery (face-to-face/distance learning): Face-to-face / distance learning		
Number of ECTS Allocated: 15		
Prerequisites: None		
Course Aims: To provide students with advanced knowledge of techniques for extraction and purification of natural products from biological materials, techniques for structural elucidation, and methods for bioactivity evaluation. To enable students to choose optimal isolation technique for selected natural products.		
Learning Outcomes: After completing the course, student is able to: (1) describe experimental techniques used for natural products isolation from biological materials, their advantages and shortcomings, (2) describe peculiarities of isolation of different natural products classes, (3) describe and apply techniques for characterization of raw fractions and isolated compounds.		
Syllabus: *Theory* Biological material processing – drying, size reduction, enzymes inhibition. Initial extraction and separation techniques – phase separation, solvent extraction, solid-phase extraction (SPE), supercritical fluid extraction (SFE), microwave extraction (MWE). Volatile compounds isolation. Chemical methods in isolation – enzymatic and chemical hydrolysis, derivatization. Raw extract purification. Liquid-liquid extraction. Chromatographic techniques in purification and isolation – chromatography modes, open-column chromatography, preparative HPLC, thin-layer chromatography (TLC), centrifugal partition chromatography (CPC). Isolation monitoring – chemical tests, bioactivity assays, activity-guided and chemical analysis-guided fractionation, dereplication. Final purification – desalting, drying, crystallization. Spectrometric methods for isolated product characterization –UV/VIS, MS, NMR, IR, XRD. *Practice* Isolation and identification of natural products from selected plant or fungal material by chromatographic techniques (TLC, open-column chromatography, pHPLC, CPC, HPLC, GC) and spectrometric techniques (UV/VIS, MS, NMR).		
Required Reading: 1. Hostettmann K, Marston A, Hostettmann M (1998): Preparative chromatography techniques – Applications in natural products isolation, Springer-Verlag Berlin Heidelberg, Germany. 2. Colegnate SM, Molyneux RJ (eds.) (2008): Bioactive natural products: detection, isolation, and structural determination, CRC Press, Boca Raton, USA 3. Berger S, Sicker D (2009): Classics in Spectroscopy: Isolation and Structure Elucidation of Natural Products, Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim, Germany 4. Sarker SD, Latif Z, Gray AI (eds.) (2006): Natural products isolation, Humana Press, Totowa, USA		
Weekly Contact Hours:	**Lectures:** 5	**Practical work:** 5 (student research)

Teaching Methods: Consulting, e-learning (OER), research, desk study project			
Knowledge Assessment (maximum of 100 points): 100			
Pre-exam obligations	points	**Final exam**	points
Submitted and defended study project	50	oral exam	50