

Course Unit Descriptor

Study Programme: PhD in Ecology			
Course Unit Title: Extreme Biochemistry			
Course Unit Code: DNE004			
Name of Lecturer(s): Assoc. Prof. Željko D. Popović, PhD; Prof. Danijela Kojić, PhD			
Type and Level of Studies: Doctor of Philosophy, Third cycle			
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: 15			
Prerequisites: Biochemistry, Animal physiology or similar			
Course Aims: The aim of this course is to introduce students to broad biochemical and physiological strategies of organisms adapted to life in extreme environments – high/low temperatures, high/low pH, high salinity, drought, anoxia etc.			
Learning Outcomes: After completing the Course, students should be able to understand both common and specific molecular/biochemical adaptations of organisms to extreme environmental factors, as well as to become more aware of potential application of selected ecological mechanisms in medicine and industry.			
Syllabus: <i>Theory</i> (1) Overview of Extreme Biochemistry. Extremophiles and Adaptation. (2) Introduction to Water Properties; (3) Protein structure and function in extreme conditions. (4) Water-solute problems: osmosensors and regulation of osmolytes; (5) Hypobiosis - the states of suppressed metabolism. (6) Cryptobiosis: the forms of “hidden” lives; (7) High/low temperature adaptations of cells and organisms. (8) Cell stress proteome – evolution and adaptation (HSP, LEA, AQP). (9) Cell membrane integrity and adaptation to stress. <i>Practice</i> Student research paper on extreme biochemistry application in the field of biotechnology, medicine, pharmacy and exobiology/astrobiology.			
Required Reading: 1. Hochachka W. P. Somero G.N.(2002): Biochemical Adaptation, Oxford University Press 2. Wilmer P., Stone G., Johnston I.(2000): Environmental Physiology of Animals, Blackwell Science Ltd.			
Weekly Contact Hours: 10	Lectures: 5	Practical work: 5	
Teaching Methods: Lectures and students practical work.			
Knowledge Assessment (maximum of 100 points):			
Pre-exam obligations	points	Final exam	points
Active class participation		written exam	40
Practical work		oral exam	60