

Study Programme : BSc in Biology, Bsc in Ecology			
Course Title: Geometric morphometrics in biological research			
Professor: Dr Jasmina Ludoški			
Required/Elective Course: Elective			
Number of ECTS: 5			
Prerequisites:			
Course Objective Geometric morphometry presents a modern morphometric method for quantitative analysis that compares and visualizes differences in size and shape of morphological structures. The aim of the course is to enable the student to master the theoretical basis and acquire knowledge and skills for applying the geometric morphometric method in biological research.			
Course Outcome Skills and knowledge for collecting and analyzing morphometric data and their application in biological research.			
Course Content: <i>Theoretical part</i> Geometric morphometrics- definition, geometric vs. traditional (linear) morphometry, size and shape of morphological structures: Landmarks coordinations and configurations (<i>landmarks</i> and <i>semilandmarks</i>)- definition, selection and data acquisition; Types of morphometric data (landmarks, curves, outlines, surfaces, 2D, 3D objects); Size and shape variable; Mathematical theory of shapes; Comparing shapes and visualisation of shape changes; Analyzing of shape variables: analytic methods for describing diversity and statistical methods for testing hypothesis <i>Practical part</i> Softwares for acquisition and preparation of morphometric data (digitizing landmarks, curves, outlines, surfaces), superimposition and size and shape variable extraction, analyzing differences and visualizing of shape changes, statistical analyses: tps (<i>thin-plate-spline</i>) softwares, MorphoJ, PAST... Geometric morphometrics in biological research: examples.			
Reading List: - Zelditch, M. L., Swiderski, D.L., Sheets, D.H. (2012) Geometric Morphometrics for Biologists. Second edition. Elsevier Academic Press, New York. - Ивановић, А., Калезић, М. (2013). Еволуциона морфологија: теоријске поставке и геометријска морфометрија. Биолошки факултет, Београд. - scientific papers			
Total hours:		Lectures: 2	Practicals: 2 + 0 + 0
Methods of instruction Lectures, practical work of students on computers, independent student work (analysis of a specific problem / topic, short presentation, debate), consultations			
Assessment (maximum number of points 100)			
Requirements	поена	Final exam	поена
Active participation in lectures		Practical exam	
Active participation in practicals		Oral exam	70
Test(s)	20	
Seminar	10		