

Course Unit Descriptor

<b>Study Programme:</b> Master Academic Study in Forensics
<b>Course Unit Title:</b> Geometric morphometrics in forensic science
<b>Course Unit Code:</b> FB-04
<b>Name of Lecturer(s):</b> Associate Professor Jasmina Ludoški, Full Professor Vesna Milankov
<b>Type and Level of Studies:</b> Master Academic Degree
<b>Course Status (compulsory/elective):</b> Elective
<b>Semester (winter/summer):</b> Summer
<b>Language of instruction:</b> English
<b>Mode of course unit delivery (face-to-face/distance learning):</b> Face-to-face
<b>Number of ECTS Allocated:</b> 6
<b>Prerequisites:</b> None
<p><b>Course Aims:</b></p> <p>Geometric morphometrics presents a modern morphometric method for quantitative analysis that compares and visualizes differences in size and shape of morphological units. The objective of the course is to provide the student with the theoretical basis and acquire knowledge and skills for applying geometric morphometric method in forensics.</p>
<p><b>Learning Outcomes:</b></p> <p>After completing the course, the student is able to:</p> <ol style="list-style-type: none"> <li>1. independently collects, analyzes and interprets geometric morphometric data;</li> <li>2. applies procedures and software packages for geometric morphometric analysis;</li> <li>3. competently communicates and reports on the performed morphometric analysis.</li> </ol>
<p><b>Syllabus:</b></p> <p><i>Theory</i></p> <p>Geometric morphometrics- definition, advantage over traditional (linear) morphometrics, size and shape of morphological units; Points (landmarks and semilandmarks) coordinates and configurations- definition, selection and data acquisition; Morphometric data- landmarks, curves, outlines, surfaces, 2d and 3d objects; Transformation of landmarks coordinates into shape variables; Mathematical theory of shape; Shape comparison and visualization of shape change; Shape variable analysis: analytical methods for describing shape diversity and statistical methods for testing hypothesis; Forensic application of geometric morphometrics: sex and age determination based on human and animal remains, bitemark analysis (forensic odontology), footprint analysis, insect species identification (forensic entomology), veterinary forensics.</p> <p><i>Practice</i></p> <p>Introduction to the use of software packages for morphometric data acquisition (digitization of points, curves, contours, surfaces), superimposition and extraction of size and shape variables, analysis and visualization of changes and differences in shape, statistical analysis: tps (thin-plate-spline) series, MorphoJ, PAST, 3D-ID...Forensic application of geometric morphometrics: case studies.</p>
<p><b>Required Reading:</b></p> <ol style="list-style-type: none"> <li>1. Zelditch, M. L., Swiderski, D.L., Sheets, D.H. (2012) Geometric Morphometrics for Biologists. Second edition. Elsevier Academic Press, New York.</li> <li>2. Slice, D.E. (ed.) (2005) Modern morphometrics in physical anthropology. Kluwer Academic, New York.</li> </ol>

3. Ivanović, A., Kalezić, M. (2013). Evolucionarna morfologija: teorijske postavke i geometrijska morfometrija. Biološki fakultet, Beograd. (in Serbian)

4. scientific papers published in relevant journals

<b>Weekly Contact Hours:</b>	<b>Lectures: 2 (30)</b>	<b>Practical work: 2 (30) + 1 (15)</b>
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**Teaching Methods:**

Lectures, practical work on computers, individual student work (analysis of a specific problem / topic, short presentation, debate), consultations

**Knowledge Assessment (maximum of 100 points):**

<b>Pre-exam obligations</b>	points	<b>Final exam</b>	points
Active class participation		written exam	
Practical work	20	oral exam	70
Preliminary exam(s)		.....	
Seminar(s)	10		

The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.