

General Information			
Course name and code	Light and Electron Microscopy Techniques ÚBEV/MEM1/99	ECTS Credits	3
		Semester	1 <sup>st</sup> (Winter) semester Master Degree
Aims			
The aim of the subject is to teach students, how to process biological material for analyses using light, fluorescent and electron microscope and to acquaint them with microscopic techniques, which are most commonly used in the biological research.			
Contents			
<ol style="list-style-type: none"> <li>1. Visible light and its properties. Lenses, objectives.</li> <li>2. History of microscopy, principles of visualization of biological samples using brightfield microscope.</li> <li>3. Special types of light microscopes.</li> <li>4. Isolation of biological material, fixation, dehydration, embedding and staining of samples for light microscopy.</li> <li>5. Types of microtomes used in histology laboratories and their operation.</li> <li>6. Principles of fluorescence, fluorescent molecules and fluorescent methods for analysis of biological samples.</li> <li>7. Principles of immunolabelling of biological samples for brightfield and fluorescent microscopy.</li> <li>8. Analysis of biological samples using epifluorescent and confocal microscope.</li> <li>9. Processing and contrasting of biological samples for transmission and scanning electron microscopy.</li> <li>10. Methods of immunolabelling of biological samples using colloidal gold nanoparticles and principles of autoradiography.</li> <li>11. Construction and operation of electron microscope, types of electron microscopes used in biological research.</li> <li>12. Special types of electron microscopes.</li> <li>13. Photography of samples and analysis of resulting image.</li> </ol>			
Evaluation			
Final evaluation: Final evaluation will be realized during the last week of winter semester in the form of discussion. Students are required to prove their knowledge on the topics discussed during the lectures and exercises.			
Grading Scale (in %): A ... 100 - 91%, B ... 90 - 81%, C ... 80 - 71%, D ... 70 - 61%, E ... 60 - 51%, Fx ... < 51%			
Grading System: The University recognizes the following six degrees for the evaluation of the study results:			
<ol style="list-style-type: none"> <li>a) A – excellent (excellent results) (numerical value 1)</li> <li>b) B – very good (above average results) (1.5)</li> <li>c) C – good (average results) (2)</li> <li>d) D – satisfactory (acceptable results) (2.5)</li> <li>e) E – sufficient (results meet the minimum criteria) (3)</li> <li>f) FX –failed (requires further work) (4)</li> </ol>			
Bibliography			
<ul style="list-style-type: none"> <li>• Gage et al.: Whole animal perfusion fixation for rodents, 2012, Journal of Visualized Experiments, 65:e3564, 1-9</li> <li>• Paddock W.: Principles and Practices of Laser Scanning Confocal Microscopy, 2000, Molecular Biotechnology, 16, 127-149</li> <li>• Griffiths and Lucoq: Antibodies for immunolabelling by light and electron microscopy: not for the faint hearted, 2014, Histochem Cell Biol, 142:347-360</li> <li>• A. Kaech: An Introduction to Electron Microscopy Instrumentation, Imaging and Preparation, Centre for Microscopy and Image Analysis, University of Zurich, 2013</li> </ul>			