



Master of Science (Zoology)  
M.Sc. Zoology Semester II

Course Code	PS02EZOO54	Title of the Course	Microtechniques
Total Credits of the Course	04	Hours per Week	04

Course Objectives:	<ol style="list-style-type: none"><li>1. To get awareness about various light and electron microscopes, their instrumentation and applications</li><li>2. To learn material processing for permanent slide preparations for light and electron microscopes.</li><li>3. To study microtomes for wax embedded and resin embedded material</li><li>4. To understand the techniques for enzyme localization</li></ol>
--------------------	---

Course Content		
Unit	Description	Weightage* (%)
1.	Light microscopy Properties of lenses, Optical corrections, Properties and types of objectives, Oculars and Illumination. Light microscopes: Bright field, dark field, fluorescence, phase contrast, polarizing, differential interference contrast. Micrometry and photomicrography.	25
2.	Basic components of electron microscopes. Thermionic and field emission guns. Types of electron microscopes: TEM, SEM, STEM, ESEM and HVEM	25
3.	Maceration, squash and clearing techniques. Sample preparation for light microscopy. Classification of fixatives, formulas', (Plant and animal samples). Sample preparation for light microscopy: Fixation, dehydration and infiltration procedures. Embedding media for light microscopy. Stains and staining procedures- negative and positive staining procedures. Microtomes: Rotary, sliding, cryostat. Histochemical localization of metabolites for light microscopy: Starch, proteins, lipids, total carbohydrates, lignins, polyphenols, nucleic acid, histones, cutin, suberin and waxes. Localization of enzymes: Peroxidase, acid phosphatase and succinic dehydrogenase.	25
4.	Freeze etching and freeze fracturing. Sample preparation for Electron microscope: Fixatives, double fixation, dehydration and infiltration procedures, embedding media for electron microscopy. Fixation and embedding of particulate samples like bacteria, virus etc. ultra-microtome and freezing ultramicrotomesemi thin sectioning, ultrathin sectioning, grids, formavar coating, Staining for electron microscopy.	25





	Ultrastructural cytochemistry: Tannin, protein, cell wall polysaccharide, lignin and membrane. Enzymes: Peroxidase and phosphatase. Immunocytochemistry.	
--	--	--

Teaching-Learning Methodology	Topics will be taught and discussed in interactive sessions using conventional black board and chalk as well as ICT tools such as power point presentations and videos. Practical sessions will be conducted in a suitably equipped laboratory either individually or in groups depending on the nature of exercise as well as availability of infrastructure. Course materials will be provided from primary and secondary sources of information.
-------------------------------	---

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand modern development in light and electron microscopy.
2.	Process plant/ animal samples for permanent slide preparation.
3.	Gain knowledge regarding various biological stains.
4.	Learn localization of various enzymes in plant/animal tissue.
5.	Get insights for histochemical localization of proteins, lipids and nucleic acids.

Suggested References:	
Sr. No.	References
1.	Marimuthu, R. (2019). Microscopy and Microtechnique. MJP Publishers, New Delhi





2.	O'Brien, T., P., McCully, M. E. (1981). The study of plant structure principles and selected methods. 1 <sup>st</sup> Edn. Termarcarphi Publications, Australia
3.	Johansen, D. A. (1940). Plant microtechnique. McGraw-Hill Book Company, Inc: London.
4.	Berlyn, G., P., Mikschy, J., P., (1976). Botanical microtechnique and cytochemistry. Wiley Blackwell. United States

On-line resources to be used if available as reference material

On-line Resources

Relevant review articles/research papers/handouts of latest development in the subject

