



THE MODULE HANDBOOK

Magister Biology Study Program

FACULTY OF BIOLOGY

PLANT MICROSCOPY AND MICROTECHNIQUE

Course code	BIMB202116
Course level	Magister
Semester/ term	Even - Odd
Course coordinator(s)	Dr. Maryani, M.Sc.
Lecture(s)	Prof. Dr. L. Hartanto Nugroho, M.Agr.Sc.
Language	Indonesia
Classification within the Curriculum	Compulsory
Teaching format/ class hours per week during the semester	This course is planned to have 14 teaching weeks and 2 weeks of examination.
Workload	Estimated working hour: 2 credits of theory and 1 credit of laboratory/field work.
Credits	2-1 credits
Requirements	-
Program Learning Outcome	<p>A1. Students are expected to be able to internalize academic values, norms, and ethics and show an independent and responsible attitude in their field of expertise related to plant microscopy and microtechnics (Attitude);</p> <p>K1. Graduates are able to demonstrate knowledge and understand biological theories, about plant microscopy and microtechnics (Knowledge);</p> <p>K2. Graduates are able to demonstrate knowledge and understand biological systems and plant microscopy and microtechnical methods to solve problems in the field of biology (Knowledge);</p> <p>GS1. Graduates are able to develop logical, critical, systematic, and creative thinking through concepts and scientific research (General Skills);</p> <p>GS2. Graduates are able to manage research data and make decisions in solving biological problems based on analytical or experimental studies and critical analysis of information (General Skills);</p> <p>GS3. Graduates are able to formulate and communicate scientific ideas effectively (written and oral) with at least one international language based on scientific principles, procedures and ethics in the form of academic writing (General Skills);</p>



THE MODULE HANDBOOK

Magister Biology Study Program

FACULTY OF BIOLOGY

	<p>GS5 Using information technology in scientific development and applying it in the field of expertise in microscopy engineering and plant microtechnical (General Skills)</p> <p>SK1. Graduates are able to carry out research in the field of biology independently or in groups, and are able to solve various problems related to plant microscopy and microtechnics (Specific Skills)</p>
Course Learning Outcome	<p>CLO1. Students have the ability to identify, mention, explain, compare, demonstrate and analyze their knowledge of microscopes and their use, various methods of providing anatomical slides for non-permanent, semi-permanent and permanent preparations, embedding method, whole mount and maseration slides preparation, squast method, leaf clearing, histochemistry technique, and localization of a compound in cells or tissues.</p> <p>CLO2. Students have the ability to plan, implement, and report an observation / experiment and research related to or require the manufacture of preparations with whole mount methods, maceration, squash, hand-slicing methods, cloaking methods for durable preparations, dams related to the manufacture of fresh preparations, microscopes and their use, histochemist, and localization of a compound in a cell or tissue.</p> <p>CLO3. Students have managerial skills and knowledge transfer to communicate effectively both written, oral and images related to plant microscopy and microtechnics and have managerial abilities to learn independently and in groups and have a curious attitude about plant microscopy and microtechnics</p>
Course Description	<p>Microscopy and Plant Microtechnique is a subject given to students of semester I master's program. This course is mandatory for students who take an interest in the study of Plant Structure and Development. The material given in this study includes the type / type of microscuscus and its use technique, the technique of preparing the preparation of the preparation / preparat antomi of the plant material to visualize the internal structure of the plant, starting from the level of cells, tissues or the whole microscopic organ, and can also visualize certain compounds present in a plant cell or tissue, including proteins, carbohydrates, nucleic acids and fats. This course will discuss the microscope, as a means to obtain an overview of the internal structure of organs or the structure of cells and tissues and their use. Various microscopes have their own specifications to show the components of cells, cells and tissues. The methods of anatomical slides preparation are studied, including the production of non-permanent, semi-permanent and permanent preparations, fresh and durable preparations, anatomical preparations resulting from results: slicing (with</p>



THE MODULE HANDBOOK

Magister Biology Study Program

FACULTY OF BIOLOGY

	<p>or without cloaking), leaf clearing, maceration, whole mount, squash. In embedding method is studied about all steps needed, including fixation (the type of fixative and the purpose and way of fixation), dehydration, infiltration, cloaking, tissue cutting and tissue staining will also be discussed. Non-embedding methods, such as freehand section and slicing with shear microtoms, aberration of plant materials, are also topics of this lecture. Furthermore, this study also discusses about micrometry and Optilab, how sample images are documented, cell or tissue measurements, the detection of biological compounds in cells by histochemistry method (reaction of tissue components with certain chemical compounds/reagents), and localization of target molecules in cells.</p>														
Assesments	<table border="1"><thead><tr><th>Assessment Component</th><th>Percentage</th></tr></thead><tbody><tr><td>Students Assignments (2x)</td><td>15%</td></tr><tr><td>Students presentation</td><td>15%</td></tr><tr><td>Mid Semester Examination</td><td>35%</td></tr><tr><td>Final Semester Examination</td><td>35%</td></tr><tr><td>Theory</td><td>100% (2 credits)</td></tr><tr><td>Laboratory Practical</td><td>1 credit</td></tr></tbody></table>	Assessment Component	Percentage	Students Assignments (2x)	15%	Students presentation	15%	Mid Semester Examination	35%	Final Semester Examination	35%	Theory	100% (2 credits)	Laboratory Practical	1 credit
Assessment Component	Percentage														
Students Assignments (2x)	15%														
Students presentation	15%														
Mid Semester Examination	35%														
Final Semester Examination	35%														
Theory	100% (2 credits)														
Laboratory Practical	1 credit														
Study Media	<p>Lecturing Slides Jurnal via Internet E-Book</p>														
Literature	<ol style="list-style-type: none">1. Johansen, D.A. 1940. Plant Microtechnique. 1st Ed. New York, USA. McGraw-Hill Book Co Ltd.2. Ruzin, S.E. 1999. Plant Microtechnique and Microscopy. Oxford University Press3. Shields, VDC and Heinbockel, T. 2018. Introductory Chapter: Histological Microtechniques. Web of Science														