	Universitas Negeri Surabaya Faculty of Mathematics and Natural Sciences Biology Undergraduate Study Program	Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Microtechniques	4620102134		T=1	P=1	ECTS=3.18	5	July 17, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	.....	.....	Dr. H. Sunu Kuntjoro, S.Si., M.Si.

Learning model	**Project Based Learning**
Program Learning Outcomes (PLO)	**PLO study program that is charged to the course**
	Program Objectives (PO)
	PLO-PO Matrix

P.O

PO Matrix at the end of each learning stage (Sub-PO)

P.O	Week															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Short Course Description	Studying microtechniques in making preparations with plant and animal specimens, including whole preparations, pejetan (squash), smears and slices, smears, immunohistochemistry. Starting from collection, fixation, dehydration, infiltration, making paraffin blocks, slicing with a microtome, staining methods both single staining and double staining. This course is presented in the form of theory and practice by producing preparatory products.
References	**Main :**

1. Johansen, D. A. 1940. Plant Microtechnique . Ist ed. New York: McGraw-Hill Publications in the Botanical Sciences.
2. Mahadevamma S, Tharanathan RN. 2007. Processed rice starch characteristics and morphology. Eur. Food Res. Technol . 225: 603-612.
3. Noor R. R. 2001. Scanning Electron Microscope [diktat]. Bogor: Lab. Pemuliaan dan Genetika Ternak, Fakultas Peternakan, IPB.
4. Pilling E, Smith AM. 2003. Growth ring formation in the starch granules of potato tubers. Plant Physiol. 132: 365-371.
5. Sass, JE. 1971. Botanical Microtechnique, Third Edition. IOWA: The IOWA State University Press.
6. Sujka M, Jamroz J. 2009. A-amylolysis of native potato and corn starches 13SEM, AFM, nitrogen and iodine sorption investigations. LWT-Food Science and Technology 42: 1219-1224.
7. Suntoro S. H. 1983. Metode Pewarnaan (Histologi dan Pewarnaan). Jakarta: Bhrata Karya Aksara.
8. Tutus A, Ates S dan Deniz I. 2010. Pulp and paper production from spruce wood with kraft and modified kraft methods. Afr J Biotechnol . 9(11) 1648-1654
9. Wang S, Yu J, Zhu Q, Yu J, Jin F. 2009. Granular structure and allomorph position in c-type Chinese yam starch granule revealed by SEM, 13C CP/MAS NMR and XRD. Food Hydrocolloids 23: 426-433.
10. Jurnal-jurnal ilmiah terkait

	Supporters:
Supporting lecturer	Dr. Nur Ducha, S.Si., M.Si. Ahmad Bashri, S.Pd., M.Si. Firas Khaleyla, S.Si., M.Si.

Week-	Final abilities of each learning stage (Sub-PO)	Evaluation		Help Learning, Learning methods, Student Assignments, [Estimated time]		Learning materials [References]	Assessment Weight (%)
		Indicator	Criteria & Form	Offline (*offline*)	Online (*online*)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

1	Understand the basic principles of microtechniques	1. Explain the meaning of microtechniques 2. Explain the scope of microtechniques 3. Explain the types of specimens 4. Explain the various methods of making preparations		Discussion, demonstration 2 X 50			0%
2	Understand various types of microtechnical equipment	1. Explain the types of glassware and their functions 2. Explain the types of small equipment and their functions 3. Explain several types of large equipment and their functions 4. Explain the working mechanisms of several types of large equipment		Discussion, demonstration 2 X 50			0%
3	Understand the preparation of materials, specimens and fixation	1. Write down various types of specimens 2. Explain the method of providing specimens 3. Explain the meaning of fixation 4. Describes several fixation methods		Discussion, demonstration, practice 2 X 50			0%
4	Understand the method of making slice preparations (in animals)	1. Explain the washing methods of various types of fixed specimens 2. Explain the meaning of dehydration 3. Explain the method of dehydration of animal specimen preparations 4. Explain the meaning of dealcoholization 5. Explain the method of dealcoholization of animal specimen preparations 6. Explain the meaning of infiltration 7. Explain the method of infiltration of animal specimen preparations 8. Explain the meaning of embedding 9. Explain the embedding method of animal specimen preparations		Discussion, demonstration, practice 2 X 50			0%
5	Understand the method of making slice preparations (in animals)	1. Explain the sectioning method of animal specimen preparations 2. Explain the meaning of affixing 3. Explain the affixing method of animal specimen preparations 4. Explain the meaning of deparaffinization 5. Explain the method of paraffinization of animal specimen preparations 6. Explain the staining method using a general dye for animals (hematoxylin eosin)		Discussion, demonstration, practice 2 X 50			0%

6	Understand the method of making plant chromosome preparations	1. Explain the method for preparing plant chromosomes 2. Explain the steps for each method of making chromosome preparations		Discussion, demonstration, practice 2 X 50			0%
7	Understand the method of making squash preparations	1. Explain the use of making squash preparations 2. Explain the types of squash preparation specimens 3. Explain the method of making squash preparations		Discussion, demonstration, practice 2 X 50			0%
8	Midterm Exam (UTS)			2 X 50			0%
9	Understand the method of making slice preparations on plants	1. Mention the types of plant specimens and the stages of the plant slice preparation method 2. Explains fixation, fixatives, fixation methods, and processes for plant slice preparations 3. Explain the mechanism of washing material from fixative solution, dehydration, clarification, infiltration of plant slice preparations		Discussion, demonstration, practice 2 X 50			0%
10	Understand various issues in slicing and gluing plant slice preparations	1. Explain the embedding of plant slices 2. Explain cutting and gluing plant slices 3. Explains various problems in cutting and gluing plant slices		Discussion, demonstration, practice 2 X 50			0%
11	Understand various types of coloring, masking, and labeling methods	1. Explain the various colorings of plant slice preparations (general coloring or safranin double coloring and natural coloring variations) 2. Explain closure and labeling		Discussion, demonstration, practice 2 X 50			0%
12	Understand the method of making smear preparations	1. Explain the use of making smear preparations 2. Explain the types of smear preparation specimens 3. Explain the method of making smear preparations		Discussion, demonstration, practice 2 X 50			0%
13	Understand the method for making whole mount preparations	1. Explain the use of making whole mount preparations 2. Explain the types of whole mount specimen preparations 3. Explain the method for making whole mount preparations		Discussion, demonstration, practice 2 X 50			0%

14	Understand the method of making immunohistochemical preparations	1. Explain the use of making immunohistochemical preparations 2. Explain the types of immunohistochemical preparation specimens 3. Explain the basic principles of the method for making immunohistochemical preparations		Discussion, demonstration, practice 2 X 50			0%
15	Understand microchemistry, micrometry and analytical methods of preparations	1. Explain the meaning of microchemistry 2. Explain the meaning of micrometry 3. Explain the analysis method of preparations		Discussion, demonstration, practice 2 X 50			0%
16							0%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
		0%

Notes

1. **Learning Outcomes of Study Program Graduates (PLO - Study Program)** are the abilities possessed by each Study Program graduate which are the internalization of attitudes, mastery of knowledge and skills according to the level of their study program obtained through the learning process.
2. **The PLO imposed on courses** are several learning outcomes of study program graduates (CPL-Study Program) which are used for the formation/development of a course consisting of aspects of attitude, general skills, special skills and knowledge.
3. **Program Objectives (PO)** are abilities that are specifically described from the PLO assigned to a course, and are specific to the study material or learning materials for that course.
4. **Subject Sub-PO (Sub-PO)** is a capability that is specifically described from the PO that can be measured or observed and is the final ability that is planned at each learning stage, and is specific to the learning material of the course.
5. **Indicators for assessing** ability in the process and student learning outcomes are specific and measurable statements that identify the ability or performance of student learning outcomes accompanied by evidence.
6. **Assessment Criteria** are benchmarks used as a measure or measure of learning achievement in assessments based on predetermined indicators. Assessment criteria are guidelines for assessors so that assessments are consistent and unbiased. Criteria can be quantitative or qualitative.
7. **Forms of assessment:** test and non-test.
8. **Forms of learning:** Lecture, Response, Tutorial, Seminar or equivalent, Practicum, Studio Practice, Workshop Practice, Field Practice, Research, Community Service and/or other equivalent forms of learning.
9. **Learning Methods:** Small Group Discussion, Role-Play & Simulation, Discovery Learning, Self-Directed Learning, Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, and other equivalent methods.
10. **Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
11. **The assessment weight** is the percentage of assessment of each sub-PO achievement whose size is proportional to the level of difficulty of achieving that sub-PO, and the total is 100%.
12. TM=Face to face, PT=Structured assignments, BM=Independent study.