



**THE MODULE HANDBOOK**  
**DOCTOR BIOLOGICAL SCIENCES STUDY PROGRAM**  
**FACULTY OF BIOLOGY**

**SELECTED TOPIC FOR DISSERTATIONS**

**Structure and Products of Plant Secretory Tissues**

<b>Course code</b>	BIDB243069
<b>Course level</b>	Doctoral Program
<b>Semester/ term</b>	Odd/even
<b>Course coordinator</b>	Prof. Dr. L. Hartanto Nugroho M.Agr.
<b>Lecture(s)</b>	Prof. Dr. L. Hartanto Nugroho M.Agr. Dr. Maryani M.Sc.
<b>Language</b>	Indonesian/English
<b>Classification within the Curriculum</b>	Compulsory Specialization Courses
<b>Teaching format/ class hours per week during the semester</b>	This course is planned to have 14 teaching weeks and 2 weeks of examination.
<b>Workload</b>	1,125 hours/day 5 days/week 5,625 hours/week 16 Weeks/Semester  total workload : 90 hours/3,6 ECTS
<b>Credits</b>	3.6 ECTS
<b>Requirements</b>	-
<b>Program Learning Outcome</b>	CPL 1.1. Upon completing this program, the graduates demonstrate an attitude of being able to contribute to improving the quality of life in society, nation and state, and the progress of civilization based on Pancasila. CPL 2.2. After attending this program, graduates demonstrate an understanding of substantial and leading theory in the field of biology/biological resources in order to support education for sustainable development CPL 3.1. After completing this program, the graduates will be able to discover or develop new scientific theories/concepts/ideas in biology CPL 3.3. After completing this program, the graduates will be able to manage and formulate valid and accountable research data by upholding academic integrity and prioritizing anti-plagiarism CPL 4.3. After participating in this program, graduates will be able to apply the philosophy of biological systems in developing



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	biological concepts in the areas of food, health, bioenergy, biomaterial and/or the environment.
<b>Course Learning Outcome</b>	<p>BIDB243069.1 By the end of this course, students will be able to Apply the concepts and working principles of the Structure and Products of Plant Secretory Tissues to investigate the biosynthetic pathways of various secondary metabolites, the characteristics of each metabolite group, their sites of synthesis and accumulation, and the methods for analyzing the distribution of secondary metabolites in plant tissues through doctoral-level research.</p> <p>BIDB243069.2 By the end of this course, students will be able to determine appropriate data types and data collection methods in accordance with dissertation research objectives within the scope of the Structure and Products of Plant Secretory Tissues.</p> <p>BIDB243069.3 By the end of this course, students will be able to develop or modify and innovate research methods to achieve dissertation research objectives within the scope of the Structure and Products of Plant Secretory Tissues</p> <p>BIDB243069.4 By the end of this course, students will be able to demonstrate the ability to select and apply appropriate data analysis methods and interpret the results to address research problems and achieve dissertation objectives within the scope of the Structure and Products of Plant Secretory Tissues, including proficiency in using software tools for analyzing the localization of secondary metabolites in plants</p>
<b>Course Description</b>	This course examines the cells and tissues involved in the accumulation of secondary metabolites in plants. The course explores secretory tissues based on their biosynthetic stages and secretory products, the classification of secondary metabolites by molecular structure and metabolic pathways, and various analytical methods for determining the localization of secondary metabolites within plant cells, tissues, and organs
<b>Assessments</b>	<p>The assessment for Selected Topic for Dissertations (Structure and Products of Plant Secretory Tissues) is based on four components, with the respective criteria and weights:</p> <ol style="list-style-type: none"><li>1. Structured Assignment/Task (20%)</li><li>2. Presentation (20%)</li><li>3. Mid-Term Exam (30%)</li><li>4. Final-Term Exam (30%)</li></ol>



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**Study Media  
and Literature**

**Main**

1. Nugroho, L. H. 2017. Struktur dan produk jaringan sekretori tumbuhan. Universitas Gadjah Mada Press. Indonesia
2. Fahn, A. 1979. Secretory Tissues in Plants. Academic Press. London.
3. Dewick, P.M. 2008. Medicinal natural product: A biosynthesis approach. John Wiley and Sons Ltd. Chichester.
4. Samuelsson, G. 1999. Drug of Natural Origin. Swedish Pharmaceutical Society. Swedish Pharmaceutical Press. Sweden.

**Additional**

1. Nugroho, L. H. dan Hartini, YS. 2020. Farmakognosi Tumbuhan Obat: Kajian Spesifik Genus Piper. Universitas Gadjah Mada Press. Indonesia
2. Nugroho, L. H. dan Hartini, YS. 2024. Tumbuhan Obat Antidiabetik: Etnomedisin, Ramuan, dan Mekanisme Aksi. Universitas Gadjah Mada Press. Indonesia.