



# THE MODULE HANDBOOK

## FACULTY OF BIOLOGY

### Plant Embryology

<b>Module code</b>	BIO 30604
<b>Module level</b>	Undergraduate
<b>Abbreviation, if applicable</b>	-
<b>Sub-heading, if applicable</b>	-
<b>Courses included in the module, if applicable</b>	-
<b>Semester/ term</b>	Odd and even
<b>Module coordinator(s)</b>	Dra. Siti Susanti, S.U.
<b>Lecture(s)</b>	Dra. Siti Susanti, S.U.
<b>Language</b>	Indonesia
<b>Classification within the Curriculum</b>	<ol style="list-style-type: none"><li>1. Elective</li><li>2. This course studies the theory and concepts related to the plant embryology both Archegoniatae and Spermatophyta.</li></ol>
<b>Teaching format/ class hours per week during the semester</b>	This course is given on the odd and even semester to S1 regular students in Faculty of Biology. Each week there are 1 meeting with time allocation of 100 minutes and 1 meeting for practical work. Learning methods are applied in this lecture is <i>Student Centered Learning (SCL)</i> .
<b>Workload</b>	This course consists of 2 credits of theory and 1 credit of laboratory work.
<b>Credit points</b>	2-1 credits
<b>Requirements</b>	Plant Structure and Development (BIO 20601)
<b>Learning goals/ competencies</b>	After attending and completing this course, the students are expected to know and understand the structure and development of reproductive organs, all related processes, both at a low and higher plants. The students are also expected to analysis and solve problems related to plant embryology and its relationship with other science. The students are also expected to use of laboratory equipment to observe the structure and development of reproductive organs and all related processes, analyzes of the observation results, planning and preparing of the research. It is also hoped the students were able to interact and communicate effectively, have high competence.



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<b>Content</b>	Plant Embryology subjects learn the concepts and theories related to embryogenesis in plants, ontogenesis that occur before embryogenesis. Course materials: introduction and the factors that affect embryogenesis in general, gametophyte, gametogenesis, gametangia structure (arkegonia and anteridia ), fertilization, embryogenesis, sporogenesis on mosses ( Bryophyts ) and ferns (Pteridophyts), female and male strobili structure, microsporogenesis, microgametogenesis, megasporogenesis, megagametogenesis, pollination, fertilization, endosperm development, embryogenesis, seed structure in gymnosperms, anther structure, microsporogenesis, microgametogenesis, ovule structure, megasporogenesis, megagametogenesis, pollination, fertilization, endosperm development, embryogenesis and seed structure in Angiosperms.
<b>Study/ exam achievements</b>	<ol style="list-style-type: none"><li>1. <b>Theory:</b> midterm (45 %), final examination (40%), assignment (20 %)</li><li>2. <b>Laboratory work:</b> pretest (30 %), laboratory report (30 %), laboratory examination (40 %)</li></ol>
<b>Forms of media</b>	White board, LCD
<b>Literature</b>	<ol style="list-style-type: none"><li>1. Bhojwani, S.S. and S.P. Bhatnagar. 1999. <i>The Embryology of Angiosperms</i>. 4<sup>th</sup> Revised &amp; Enlarged Edition Vikas Publishing House Pvt Ltd.</li><li>2. Foster, A.S. and M. Gifford. 1974. <i>Comparative Morphology of Vascular Plant</i>. Second edition. W.H. Freeman and company. San Fransisco. Pp 634-650.</li><li>3. Johansen, D.A. 1950. <i>Plant Embryology: Embryogeny of The Spermatophyta</i>. Chronica Botanica Co.</li><li>4. Maheshwari, P. 1950. <i>An Introduction to the Embryology of Angiosperms</i>. First Edition Mc Graw-Hill Book Company, Inc. new York Toronto London</li><li>5. Vashista, B.R. 1985. <i>Botany: Bryophyta</i>. Fourth Ed. S. Chand and Co. Ltd. New Delhi.</li><li>6. Vashista, P.C. 1984. <i>Botany: Pteridophyta</i>. Fourth Ed. S. Chand and Co. Ltd. New Delhi.</li><li>7. Vashista, P.C. 1983. <i>Botany: Gymnospermae</i>. First Ed. S. Chand and Co. Ltd. New Delhi.</li><li>8. Wardlaw, C.W. 1955. <i>Embryogenesis in Plants</i>. First Ed. John Wiley and Sons, Inc. New York.</li><li>9. Bajaj, Y. P.S. (ed.). 1995. <i>Biotechnology in Agriculture and Forestry: Somatic Embryogenesis and Synthetic Seed I</i>. Springer – Verlag, Berlin, Heidelberg, New York.</li><li>10. Chupecau, Y.; M. Caboche and Y. Henry (eds.). 1996. <i>Androgenesis and Haploid Plants</i>. Springer – Verlag, Berlin, Heidelberg, New York.</li></ol>



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11. Buvat, R. 1989. *Ortogeny, Cell Differentiation, and Structure of Vascular Plants*. Springer – Verlag, Berlin.
12. Johri, B.M. (ed.). 1984. *Embryology of Angioperms*. Springer – Verlag, Berlin.
13. Raghavan, V. 1997. *Molecular Embryology of Flowering Plants*. Cambridge University Press, Cambridge.
14. Shivanna and Sawhney (eds.). 1997. *Pollen Biotechnology for Crop Production and Improvement*. Cambridge University Press, Cambridge.
15. Thorpe, T.A. (ed.). 1995. *In Vitro Embryogenesis in Plant*. Kluwer Acab. Publ. Dordreeht, Boston, London.