



# THE MODULE HANDBOOK

## FACULTY OF BIOLOGY

### Paleobotany and Palynology

<b>Module code</b>	BID 41007IUP
<b>Module level</b>	3 <sup>rd</sup> year of Undergraduate Program in Biology
<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
<b>Module coordinator(s)</b>	Dr. Ratna Susandarini, M.Sc.
<b>Lecture(s)</b>	Dr. Ratna Susandarini, M.Sc.
<b>Language</b>	English
<b>Classification within the Curriculum</b>	Elective course
<b>Teaching format/class hours per week during the semester</b>	This course is organized into one class and planned to have 14 teaching weeks and 2 weeks of examination.
<b>Workload</b>	Estimated working hour: 7 hours/week.
<b>Credit points</b>	2-0 credits
<b>Requirements</b>	(BIB 30005IUP), Plant Systematics (BIB 21001IUP)
<b>Learning goals/competencies</b>	<ol style="list-style-type: none"><li><b>1. Knowledge and understanding</b><ol style="list-style-type: none"><li>a. Types of plant fossils and their characteristics.</li><li>b. Fossilization: environment and process.</li><li>c. Extinct plant taxa: general features and their fossils: Lycopsidea, Sphenopsida, Filicopsida, Progymnospermopsida, Gymnospermopsida.</li><li>d. The use of fossil data for reconstruction of plant phylogeny.</li></ol></li><li><b>2. Basic skill for</b><ol style="list-style-type: none"><li>a. Observing external and internal structure of plant fossils.</li><li>b. Collecting pollen and spore samples, both modern and fossils.</li><li>c. Identifying pollen and spores.</li></ol></li><li><b>3. Ability to</b><ol style="list-style-type: none"><li>a. Write a resume of scientific paper.</li><li>b. Present personal opinion and work as a team.</li><li>c. Communicate ideas (oral and written).</li></ol></li></ol>
<b>Content</b>	The objectives of this course are to provide students with knowledge and understanding on plant fossils in relation



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	<p>to Plant Systematics and Evolution, biological aspects of pollen grains and spores, and to provide students with basic skill for identifying pollen and spores. Paleobotanical content includes introduction to types of plant fossils, fossilization media, fossilization processes, methods of fossil observation, description of plant fossil taxa, and application of fossils in phylogeny reconstruction. Palynological content includes morphology of pollen and spores, techniques for collecting pollen samples, methods of microscopic pollen slides, and applications of palynology in health, plant systematic, paleoecology, and oil exploration. Learning methods applied in this course are lectures, individual assignments, term papers, group discussion and presentation, and simulation of pollen identification. Assessment of this course is consisted of quizzes, individual assignments, group activities, midterm exam and final exam.</p>
<b>Study/exam achievements</b>	<ol style="list-style-type: none"><li>1. Quizzes: 10%</li><li>2. Individual paper (writing resume of scientific paper: 15 %</li><li>3. Group discussion and presentation: 20%</li><li>4. Midterm exam: 25%</li><li>5. Final exam: 30%</li></ol>
<b>Forms of media</b>	White board, notebook, specimen, LCD
<b>Literature</b>	<ol style="list-style-type: none"><li>1. Blackmore, S. &amp; Barnes, S.H. (Eds.). 1991. Pollen and spores patterns of diversification. Linnean Society of London. Oxford Science Publication.</li><li>2. Cleal, C.J. (Ed.) (1991): Plant fossils in geological investigation - the Palaeozoic. Ellis Horwood, Chicester.</li><li>3. Cleal, C.J. &amp; Thomas, B.A. (1999): Fossils illustrated: Plant fossils. The Boydell Press, Woodbridge.</li><li>4. Erdtman, G. 1952. Pollen morphology and plant taxonomy, Angiosperms. The Chronica Botanica Co., Waltham, Mass., Printed by Almquist Wiksell, Stockholm, Sweden.</li><li>5. Fægri, K., &amp; Iversen, J., 1989, Textbook of Pollen Analysis, New York, John Wiley and Sons. Inc.</li><li>6. Gensel, P.G. &amp; Edwards, D. (Editors) (2001): Plants invade the land - Evolutionary and environmental perspectives. Columbia University Press, New York.</li><li>7. Kenrick, P. &amp; Crane, P.R. (1997): The origin and early diversification of land plants - A cladistic study. Smithsonian Institution Press.</li><li>8. Stewart, W.N. and Rothwell, G.W. (1993): Paleobotany and the evolution of plants. Second edition. Cambridge University Press, Cambridge.</li><li>9. Thomas, B.A. &amp; Spicer, R.A. (1987): The evolution an palaeobiology of land plants. Croom Helm, London.</li></ol>



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10. Taylor, T.N. and Taylor, E.L. (1993): The biology and evolution of fossil plants. Prentice Hall, Englewood Cliffs.
  11. Krzywinski, K.; Faegri, K; Iversen, J.; Kaland, P. E. 2000. Textbook of Pollen Analysis. The Blackburn Press.
  12. Moore, P.D., J.A. Webb, and Collinson, M.E. 1991. Pollen analysis. Blackwell Scientific, London
- Traverse, A. 2007. Paleopalynology 2<sup>nd</sup>, Springer.

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Journals:

1. Review of Palaeobotany and Palynology
  2. American Journal of Botany
  3. Acta Palaeobotanica
  4. The Palaeobotanist
  5. Taxon
  6. Annals of Botany
  7. Systematic Botany
  8. Botanical Journal of the Linnaean Society
  9. Journal of Systematics and Evolution
  10. Plant Systematics and Evolution
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