

## Plant Structure, Function and Development

Module name		Plant Structure, Function and Development				
Module level		2 <sup>nd</sup> year of Bachelor program				
Abbreviation, if applicable						
Sub-heading, if applicable						
Courses included in the module, if applicable		BI-2202 Plant Structure and Development BI-2203 Plant Physiology				
Semester/term		4 <sup>th</sup> Semester				
Module coordinator(s)		Dr. Rizkita Rachmi Esyanti				
Lecturer(s)		Dr. Erly Marwani Dr. Iriawati Dr. Rizkita R Esyanti Dr. Trimurti H Wardani				
Language		Face-to – face in Class : Indonesian Slide/Text Book/Hands out : English				
Classification within the Curriculum		Compulsory courses for Bachelor Program in Biology				
Teaching format/ class hours per week during the semester		2 parallel classes consists of 40 students / class: Lecture (Face to face lecture & student presentation): 66% • Lecture : 6 hours x 14 weeks				
Workload	Total Workload	288 hours; 3(1) CU= 10 ECTS				
		Face to face teaching	Structured Activities	Independent study	Exam	Total
	Lecture	84	96	96	12	288
	Total					288
Credit points		<i>Plant Structure and Development (3) CU &amp; Plant Physiology (3) CU</i>				
Requirements		<i>Fundamental Biology; Basic sciences (Math, Physics, Chemistry)</i>				
Content	<p>1. Plant Structure and development :</p> <p>This course is designed to introduce understanding of Plant structure and development in the level of cell, tissue, organ, and organism, such as</p> <ul style="list-style-type: none"> <li>- Plant life cycle,</li> <li>- plant organization;</li> <li>- plant cell structure and function;</li> <li>- structure and function of ground, dermal and vascular tissues (xylem and phloem) system;</li> <li>- structure and development of root, stem and leaf; modified organ;</li> <li>- plant architecture;</li> <li>- plant reproduction system : sexual and asexual reproduction; embryogenesis (zygotic and somatic), fruit development; seed development and germination</li> </ul> <p>2. Plant Physiology :</p> <p>In this course, the structure and development of plant is studied in term of physiology of plants at the level of the cells, the tissues and the whole plant.</p> <ul style="list-style-type: none"> <li>- the form and function relationships with respect to the main functions of the plant i.e., <b>the transport</b> of e.g. water, ions and sugars and the uptake of water and nutrients from the soil as well as <b>metabolism</b> of e.g. photosynthesis, respiration and linked primary (N, protein and lipid metabolism) and secondary metabolism.</li> <li>- the diversity in the plant kingdom which influence the physiology of the plant, e.g. differences between monocots and dicots, plants with and without secondary growth, and plants with C3-, C4- or CAM-photosynthesis.</li> <li>- the basic principles of regulation of growth and development by plant hormones and environment (e.g. photo-morphogenesis)</li> <li>- Structural and physiological aspects of the regulation of e.g. seed dormancy and root and shoot growth, flowering, as well as regenerative capacity of cells, tissues and organs to illustrate plant developmental flexibility, include in vitro plant</li> </ul>					

Learning goals/ competencies	<p><i>After completion of this module students are expected to be able to:</i></p> <p>Knowledge :</p> <p>1. <i>Plant Structure &amp; Development</i></p> <ul style="list-style-type: none"> <li>describe plant structures, growth and development by, eg. making and interpreting of structure and anatomy of plant parts;</li> <li>recognize and describe the various types of differentiated cells and tissues of a plant</li> <li>recognize patterns of tissue formation resulting from meristem activity; related to plant stage of life and response to environment condition</li> <li>recognize plant reproductive system, including development of plant reproductive organ, and its application</li> </ul> <p>2. <i>Plant Physiology</i></p> <ul style="list-style-type: none"> <li>explain the relations between structure and function of various parts of the plant body;</li> <li>explain, evaluate, and effectively interpret concepts relating to plant physiology, such as transport ,metabolism, growth and development.</li> <li>explain the basal mechanisms of the physiological processes, as well as basal eco-physiological adaptations of these processes to environment;</li> <li>Comprehend the concept that biological processes are regulated at all levels of biological organization, particularly related to hormones and genes.</li> <li>explain, recognize, present and discuss the (theoretical) backgrounds of the processes that regulate growth and development of plants, both from an anatomical/cell biological and a physiological point of view;</li> </ul> <p>Skill:</p> <ul style="list-style-type: none"> <li>search for and present relevant information from scientific publications dealing with plant structure, function and development biology issues</li> <li>develop and enhance communication skills through a variety of writing assignments and presenting paper</li> <li>analyze the effects of environmental (physical/chemical/biological) changes on plant growth and development (both regarding structural and physiological aspects) in plant cell and physiological processes</li> </ul> <p>Competences :</p> <ul style="list-style-type: none"> <li>Describe strategies for increasing added value in major food, feed, biofuel and medicinal plants</li> <li>Apply critical thinking in evaluating and explaining plant developmental biology issues</li> </ul>																				
	Study/exam achievements	<p><i>Lecture (100 %)</i></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;"><i>Midterm exam I</i></th> <th style="text-align: center;"><i>Final exam</i></th> <th style="text-align: center;"><i>Assignment</i></th> <th style="text-align: center;"><i>Quizzes</i></th> <th style="text-align: center;"><i>Student class presentation</i></th> <th style="text-align: center;"><i>Total</i></th> </tr> </thead> <tbody> <tr> <td><i>Lecture</i></td> <td style="text-align: center;">30%</td> <td style="text-align: center;">30%</td> <td style="text-align: center;">15%</td> <td style="text-align: center;">10%</td> <td style="text-align: center;">15%</td> <td style="text-align: center;">100%</td> </tr> </tbody> </table>								<i>Midterm exam I</i>	<i>Final exam</i>	<i>Assignment</i>	<i>Quizzes</i>	<i>Student class presentation</i>	<i>Total</i>	<i>Lecture</i>	30%	30%	15%	10%	15%
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Forms of media	<p><i>Classical teaching tools:</i></p>		<p><i>white board/ chalk and talk, animation, power point,</i></p>																		
	<p><i>Integrated teaching tools:</i></p>		<p>-</p>																		
	<p><i>Digital teaching tools:</i></p>		<p><i>Web based : Blended learning</i></p>																		
	<p><i>Problem based teaching tools:</i></p>		<p>-</p>																		
Literature	<ol style="list-style-type: none"> <li>Beck, C.B. 2006. An introduction to plant structure and development. Cambridge Univ. Press, Cambridge.</li> <li>Dickinson, W. C. 2000. Integrative Plant Anatomy. Harcourt Academic Press, New York.</li> <li>Evert, R.F. 2006. Esau's Plant Anatomy. Wiley Interscience.</li> <li>Hopkins, W.G. &amp; Huner, N.P.A. 2004. Introduction to Plant Physiology 3rd ed. John Wiley &amp; Sons, Inc.</li> <li>Lersten, N.R. 2004. Flowering Plant Embryology. Blackwell Publishing.</li> <li>Opick, H. &amp; S.A. Rolfe. 2005. The Physiology of Flowering Plants. Cambridge Univ. Press</li> <li>Taiz, L. &amp; Zeiger, E. 2006. Plant Physiology. 4th ed. Sinauer Ass, Inc., Publ. Sunderland, Massachusetts</li> </ol>																				