



UNIVERSITI TEKNOLOGI MARA

BIO611: PLANT PHYSIOLOGY

Course Name (English)	PLANT PHYSIOLOGY APPROVED
Course Code	BIO611
MQF Credit	4
Course Description	This course focuses on the cellular and molecular mechanisms underlying the life processes of plants. It will examine major plant functions with emphasis on the physiology of water relation, photosynthesis, translocation of photoassimilates and control of plant growth by light and hormones and issues of plant biotechnology and bioeconomy. Students should be able to describe various correlations between plant form and function. Mass lecture sessions are accompanied with occasional active learning activities besides laboratory practical to provide hands-on learning experience. The outcomes shall be assessed through a variety of tools which include the traditional final examination, quizzes, assignments and laboratory reports.
Transferable Skills	1. Practical skills 2. Problem solving and scientific reasoning 3. Managerial and Entrepreneurial
Teaching Methodologies	Lectures, Lab Work, Web Based Learning
CLO	CLO1 Display practical skills in relation to plant physiology and biotechnology CLO2 Describe the structure and functions of plants, and the physiological aspects in plant growth and development as well as plant biotechnology processes. CLO3 Organize information management skills related to biotechnology-based plant product.
Pre-Requisite Courses	No course recommendations
Topics	
1. 1.0 Plants, Water and Mineral 1.1) 1.1 Plant Cells and Water 1.2) 1.1.1 Plant structures and whole plant 1.3) 1.1.2 Water movement in cells and tissues 1.4) 1.1.3 Water movement in whole plant 1.5) (Water balance) 1.6) 1.7) LAB 1 : Plant Structure, Anatomy and Function 1.8) LAB 2 : Stomatal Distribution on Leaves of Several 1.9) Selected Plants 1.10) 1.11) 1.2 Root, Soils and Nutrient Uptake 1.12) 1.2.1 Membrane Transport 1.13) 1.2.2 Ion Uptake by roots 1.14) 1.2.3 Mineral Deficiencies 1.15) 1.16) LAB 3 : Transpiration as a Mechanism of Water Transport in the Xylem 1.17) 1.18) 1.3 Plants and Nitrogen 1.19) 1.3.1 Nitrogen cycle 1.20) 1.3.2 Symbiotic nitrogen fixation in legumes 1.21) 1.3.3 Nitrogen assimilation 1.22) 1.23) LAB 4 : Seed Germination and Growth Using Mineral Nutrient Solutions in Hydroponic System	

2. 2.0 Plants, Energy and Carbon

- 2.1) 2.1 Introduction to Photobiology
- 2.2) 2.1.1 Physical nature of light
- 2.3) 2.1.2 Photoreceptor
- 2.4) 2.2 Photosynthesis; Bioenergetics
- 2.5) 2.2.1 Photosynthesis(PS), leaves and chloroplast
- 2.6)
- 2.7) LAB 5: Photosynthesis and Respiration
- 2.8)
- 2.9) 2.3 Carbon Metabolism
- 2.10) 2.3.1 Translocation and Distribution of
- 2.11) Photoassimilates

3. 3.0 Regulation of Plant Development

- 3.1) 3.1 Patterns in Plant Development
- 3.2) 3.1.1 Growth, Differentiation and Development
- 3.3)
- 3.4) 3.2 The Role of Hormones in Plant Development
- 3.5) 3.2.1 Plant hormones, function
- 3.6) 3.2.2 Plant hormones, mechanism of action
- 3.7)
- 3.8) LAB 6: Hormonal Control of Leaf Senescence
- 3.9)
- 3.10) 3.3 Responses to light
- 3.11) 3.3.1 Phytochrome, Photomorphogenesis
- 3.12)
- 3.13) 3.4 Plant movement – Orientation in Space
- 3.14) 3.4.1 Phototropism, Gravitropism, Nastic
- 3.15) Movement
- 3.16) 3.4.2 Photoperiodism and Rhythmic phenomena
- 3.17) Temperature and Plant Development

4. 4.0 Plant Biotechnology and Bioeconomy

- 4.1) 4.1 Plant Physiology and Biotechnology
- 4.2) 4.1.1 Recombinant DNA Technology and
- 4.3) Protoplast Fusion
- 4.4) 4.1.2 Metabolic Engineering and Molecular
- 4.5) Farming
- 4.6) 4.1.3 Tissue Culture and Secondary
- 4.7) Metabolites/Product
- 4.8)
- 4.9) Lab 7 : Sterilization and Seeds Culture
- 4.10) Lab 8 : Plant Hormones and Plant Tissue Culture

Assessment Breakdown	%
Continuous Assessment	50.00%
Final Assessment	50.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Assignment	The topic must related to plant	20%	CLO3
	Practical	Lab (Lab report)	10%	CLO1
	Test	One test	20%	CLO2

Reading List	Recommended Text	<ul style="list-style-type: none"> Eduardo Zeiger and Lincoln Taiz Peter Scott 2014, <i>Plant Physiology and Development.</i>, All, Sinauer Associates, Incorporated, US.
	Reference Book Resources	<ul style="list-style-type: none"> Daniel Chamovitz 2013, <i>What a Plant Knows: A Field Guide to the Sense</i>, Scientific American James D. Mauseth 2016, <i>Botany: An Introduction to Plant Biology.</i>, Jones and Bartlett Publisher Incorporation. Robert E Blankenship 2014, <i>Molecular mechanism of photosynthesis</i>, John Wiley and Sons Ltd. Aqil Ahmad, Mohammed Nasser Alyemini 2013, <i>Salicylic Acid: Plant Growth and Development.</i>, Springer Dordrecht Heidelberg New York London Linda Chalker –Scott 2015, <i>How Plants Work: The Science Behind the Amazing Things Plants Do.</i>, Timber Press
Article/Paper List	This Course does not have any article/paper resources	
Other References	This Course does not have any other resources	