



UNIVERSITI TEKNOLOGI MARA

AGR254: ENTOMOLOGY

Course Name (English)	ENTOMOLOGY APPROVED
Course Code	AGR254
MQF Credit	3
Course Description	The course will introduce students to the study of insects as agricultural pest and their methods of control. It covers topics including pest, importance of insect, external and internal anatomies, and the development and metamorphosis of insect. Emphasis will be given to the classification and identification of orders such as Orthoptera, Isoptera, Hemiptera, Coleoptera, Lepidoptera, Diptera and Hymenoptera. This course will also highlight the economic crop pests and Insect Pest Management (IPM). Some aspects of insecticides will also be introduced especially in the classification, mode of action, toxicity and safety. Students will have the opportunity to carry out hands on exercise which involves laboratory, field studies and collection of insects for identification and preservation.
Transferable Skills	At the end of the course, the students will be able to demonstrate and teach their subordinates how to use pesticides judiciously and efficiently. Students will also be able to pass the knowledge of identifying pests and method of managing the pests.
Teaching Methodologies	Lectures, Blended Learning, Demonstrations, Case Study, Simulation Activity, Presentation
CLO	CLO1 Describe the concept of entomology, classifications of insects, common insect pests and relate the importance of insect structures and morphology as factors influencing their development to pest status in agriculture. CLO2 Recognize, describe and identify the common insect pests in plants. CLO3 Apply the pest control methods and strategy with emphasis to Integrated Pest Management approach
Pre-Requisite Courses	No course recommendations
Topics	
1. Pest 1.1) 1.1 Definition of pest 1.2) 1.2 Factors Leading to the Development of Pest Status 1.3) 1.3 Definition of Terms 1.4) 1.4 Pest Damage 1.5) 1.5 Pest Forecasting	
2. Importance of Insects 2.1) 2.1 Economic importance of Insects 2.2) 2.2 Factors contributing to the success of insect	
3. Classification of Insects 3.1) 3.1 Classification of the phylum Arthropoda and chief characteristics of the class Insecta/Hexapoda	
4. External Anatomy of Insects 4.1) 4.1 Exoskeleton : structure of exoskeleton 4.2) 4.2 Head : types : hypognathus & prognathus (antennae, mouthparts and eyes) 4.3) 4.3 Thorax : legs : general structure and modifications, wings : general structure and modifications 4.4) 4.4 Abdomen : cerci, external genitalia, other appendages	
5. Development and Metamorphosis 5.1) 5.1 Metamorphosis : definition and types : ametabolous, hemimetabola & holometabola 5.2) 5.2 Types of larvae : campodeiform, carabaeiform, elateriform etc 5.3) 5.3 Types of pupa : obtect, exarate, coarctate 5.4) 5.4 Process and control of molting	

6. Internal Anatomy of Insects

- 6.1) 6.1 Alimentary system
- 6.2) 6.2 Excretory system
- 6.3) 6.3 Tracheal system
- 6.4) 6.4 Circulatory system
- 6.5) 6.5 Nervous system
- 6.6) 6.6 Endocrine system
- 6.7) 6.7 Exocrine system
- 6.8) 6.8 Reproductive system

7. Orders in the class Insecta

- 7.1) 7.1 Sub-class : Apterygota (Non-winged)
- 7.2) 7.2 Sub-class : Pterygota (Winged): Exopterygota & Endopterygota

8. Insect Pest Management (IPM)

- 8.1) 8.1 Insect Control
- 8.2) 8.1.1 Natural Control (climatic factors, topographical factors, & biotic factors)
- 8.3) 8.1.2 Artificial Control (cultural control, biological control, physical/mechanical control, legal/regulatory control, chemical control)
- 8.4) 8.2 Terms associated with IPM
- 8.5) 8.3 Components of IPM

9. Pests of Economic Crops and their Control

- 9.1) 9.1 Rubber
- 9.2) 9.2 Oil Palm
- 9.3) 9.3 Cocoa
- 9.4) 9.4 Paddy
- 9.5) 9.5 Other economic crops

10. Pesticide Application Technology

- 10.1) 10.1 Classification of insecticides
- 10.2) 10.1.1 Inorganic insecticides
- 10.3) 10.1.2 Organic insecticides
- 10.4) 10.2 Pesticides calculation and calibration

Assessment Breakdown	%
Continuous Assessment	60.00%
Final Assessment	40.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Assignment	Discuss five (5) methods of insect pest control in IPM that are harmless to the environment for one industrial crop in Malaysia	20%	CLO3
	Test	Online Test - Multiple Choice, True & False, & Short Answer / Essay Question covers Chapter 1-6	20%	CLO1
	Written Report	Virtual Laboratories Report	20%	CLO2

Reading List	Recommended Text	Reference Book Resources
	<ul style="list-style-type: none"> • Elzinga, R.J. 2001, <i>Fundamentals of Entomology</i>, 8 Ed., , Prentice Hall Inc., New Jersey [ISBN:] • Romoser, W.S. and Stoffolano, J.G. , <i>The Science of Entomology</i>, 6 Ed., , The McGraw-Hill Companies, Inc. 605 pp [ISBN:] • Peters, T.M. , <i>Insects and Human Society</i>, Ed., , Van Norstrand Reinhold Company, New York. 450 [ISBN:] • Hill, D.S., <i>The Economic Importance of Insects</i>, Ed., , Chapman and Hall, 2-6 Boundary Row, London. 3 [ISBN:] • Larry P. Pedigo, <i>Entomology and Pest Management</i> [ISBN: 9780130195678] • P. J. Gullan, P. S. Cranston 2004, <i>The Insects</i>, Wiley-Blackwell [ISBN: 1405111135] • Marc J. Klowden 2007, <i>Physiological Systems in Insects</i>, Elsevier [ISBN: 9780123694935] • D Dent 2005, <i>Insect Pest Management</i>, 2nd Ed., CABI Publishing [ISBN: 0851993400] 	<ul style="list-style-type: none"> • Yunus, A. and A. Balasubramaniam 1981, <i>Major Crop Pests in Peninsular Malaysia</i>, Ed., , Ministry of Agriculture Malaysia Kuala Lumpur [ISBN:] • Atkins, M.D. 1988, <i>Insects in Perspectives (Tinjauan Terhadap Se</i>, Ed., , Dewan Bahasa dan Pustaka, Kuala Lumpur [ISBN:] • Hill, D 1975, <i>Agricultural Insect Pests of the Tropics and</i> , Ed., , Cambridge University Press, London [ISBN:] • Ibrahim, Y. dan K.K. Chong 1989, <i>Serangga Perosak Utama Tanaman di Malaysia</i>, Ed., , Dewan Bahasa dan Pustaka, Kuala Lumpur [ISBN:] • Dennis S. Hill, Fatimah Abang, <i>The Insects of Borneo</i> [ISBN: 9789839257281]
Article/Paper List	This Course does not have any article/paper resources	
Other References	This Course does not have any other resources	