	Ministry of Higher Education and Scientific Research - Iraq University of AL_mustaqbal College of Science Department of Biology	

Module Information

معلومات المادة الدراسية

Module Title	FUNDAMENTALS OF ENTOMOLOGY	**Module Delivery**	
Module Type	CORE	**Theory** **Lecture** **Lab** **Practical** **Seminar**	
Module Code	UOMU0601031		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	2	**Semester of Delivery**	3
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	Prof. Dr. Ali Shaalan Moalif	**e-mail**	ali.s.moalif@uomus.edu.iq
Module Leader's Acad. Title	Asst. Prof.	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	None
Peer Reviewer Name		**e-mail**	
Review Committee Approval		**Version Number**	

Relation with Other Modules العلاقة مع المواد الدراسية الاخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	
Module Aims, Learning Outcomes and Indicative Contents اهداف المادة الدراسية ومخرجات التعليم			
Module Aims اهداف المادة الدراسية	1. Understand the comparative morphology of insect organ systems. 2. Understand how the morphology of an organ is related to its function. 3. To provide the concept of structure and function of various organs and organ systems of insects.		
Module Learning Outcomes مخرجات التعليم والتعلم	1. The course will cover study of insect development and physiology of exoskeleton, endoskeleton and different systems; hormones and pheromones. 2. To provide concepts of comparative physiology, their functions and origin in different insect orders and families. 3. To provide the basic concept of insect origin in the time dimension. 4. To provide the basic concept of impact of environment on insects, and insects as indices of environmental changes 5. Identify the distinguishing characteristics of an insect. 6. Identify the three main sections of an insect.		
Indicative Contents المحتويات الارشادية	• Entomology is the study of insects and their interactions with their surroundings and other lifeforms. Through studying the Entomology Course, students will learn of the importance of insects, how they are classified, the external and internal structures of their bodies, how they detect stimuli, how they reproduce and grow, their defense mechanisms, how entomologists collect insects, and how we interact with them. • Beginning with an introduction to the subject, the course explains what entomology is and explores its history, and the importance of insects and insect biodiversity. You'll learn how systematic classification works, common types of insects and how to identify insects. • Students will explore the structures of insects - externally and internally. We'll cover the various parts of an insect, some functions of insect body parts and the general framework of an insect. We then discuss the biochemical breakdown, absorption, and excretion process of insects, the internal structures and their functions, and the female		

	and male internal organs of many insects. We'll also look into the ways in which insects detect stimuli and the behaviors that are elicited or changed by environmental stimuli. • The Entomology Course covers the various aspects of the reproductive system of insects, including the reproductive system itself. We also look into embryological development, the patterns of insect growth phases from egg to adult, the different types of metamorphosis and their significance, and the effects genetics and environment have on their development.
Learning and Teaching Strategies استراتيجيات التعليم والتعلم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم خلال الفصل		**Structured SWL (h/w)** الحمل الدراسي المنتظم اسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم خلال الفصل		**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب اسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي			

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7

assessment	**Final Exam**	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Lecture # 1- Arthropod Evolution** 1. Arthropod Diversity 2. Evolutionary Relationships of Arthropods 3. The Uniramians • Myriapoda-Hexapoda Relationships (Arachnida, Crustacea)
Week 2	**Lecture # 2- The Success of Insects** 1. The Adaptability of Insects 2. The Importance of Environmental Changes
Week 3	**Lecture # 3- External Structure** 1. General Body Parts 2. The Head 1) General Structure 2) Head Appendages a. Antennae b. Mouthparts The Neck and Thorax 1) The Neck 2) Structure of the Thorax 3) Thoracic Appendages a. Legs b. Wings 3. The Abdomen 1) General Structure 2) Abdominal Appendages a. External Genitalia b. Other Appendages
Week 4	**Lecture # 4- Insect Diversity** 1. Primitive Wingless Insects 2. Evolution of Winged Insects 1) Origin and Evolution of Wings 2) Phylogenetic Relationships of the Pterygota 3) Origin and Functions of the Pupa
Week 5	**Lecture # 5- The Integument** 1. Cuticle Formation 1) Preecdysis 2) Ecdysis 3) Postecdysis 4) Coordination of Events

	2. Functions of the Integument
Week 6	**<u>Lecture # 6</u>- Sensory Systems** 1. Mechanoreception 1) Sensory Hairs 2) Proprioceptors 3) Signal Detection 2. Sound Reception 1) Johnston's Organ 2) Tympanal Organs 3) Subgenual Organs 3. Photoreception 1) Compound Eyes a. Form and Movement Perception b. Distance Perception c. Spectral Sensitivity and Colour Vision d. Sensitivity to Polarized Light 2) Simple Eyes
Week 7	Mid-term Exam
Week 8	**<u>Lecture # 7</u>- Nervous and Chemical Integration** 1. Nervous System 1) Central Nervous System 2) Visceral Nervous System 3) Physiology of Neural Integration 4) Learning and Memory
Week 9	**<u>Lecture # 8</u>- Food Uptake and Utilization - 1** 1. Food Selection and Feeding 2. The Alimentary System 1) Salivary Glands 2) Foregut 3) Midgut 4) Hindgut 3. Gut Physiology 1) Gut Movements 2) Digestion 3) Absorption 4. Metabolism 1) Sites of Metabolism 2) Carbohydrate Metabolism 3) Lipid Metabolism 4) Amino Acid and Protein Metabolism
Week 10	**<u>Lecture # 9</u>- Food Uptake and Utilization - 2** 5. Metabolism 5) Sites of Metabolism a. Fat Body b. Mycetocytes 6) Carbohydrate Metabolism

	7) Lipid Metabolism Amino Acid and Protein Metabolism
Week 11	**<u>Lecture # 10</u>- The Circulatory System** 1. Structure 2. Physiology 1) Circulation 2) Heartbeat 3. Hemolymph 1) Plasma a. Composition b. Functions 4. Hemocytes 1) Origin, Number, and Form 2) Functions
Week 12	**<u>Lecture # 11</u>-Nitrogenous Excretion and Salt and Water Balance** 1. Excretory Systems 1) Malpighian Tubules—Rectum 2) Other Excretory Structures 2. Nitrogenous Excretion 1) The Nature of Nitrogenous Wastes 2) Physiology of Nitrogenous Excretion 3) Storage Excretion 3. Salt and Water Balance 1) Terrestrial Insects 2) Freshwater Insects 3) Brackish-Water and Saltwater Insects 4. Hormonal Control
Week 13	**<u>Lecture # 12</u>- Reproduction** 1. Structure and Function of the Reproductive System 1) Female 2) Male 2. Ovulation 3. Oviposition 1) Site Selection 2) Mechanics and Control of Oviposition 3) Oothecae
Week 14	**<u>Lecture # 13</u>- Gas Exchange** 1. Organization and Structure of the Tracheal System 1) Tracheae and Tracheoles 2) Spiracles 2. Movement of Gases within the Tracheal System 1) Diffusion 2) Discontinuous Gas Exchange 1. Active Ventilation
Week 15	**<u>Lecture # 14</u>- Muscles and Locomotion** 2. Muscles 1) Structure

	2) Physiology 3. Locomotion 4. Flight 1) Structural Basis 2) Aerodynamic Considerations 3) Mechanics of Wing Movements 4) Control of Wing Movements 5. Orientation
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Methods of collection and preservation of insects including immature stages
Week 2	Lab 2: External features of Grasshopper/Blister beetle
Week 3	Lab 3: Types of insect antennae, mouthparts and legs
Week 4	Lab 4: Types of insect mouthparts
Week 5	Lab 5: Types of insect legs
Week 6	Lab 6: Wing venation, types of wings and wing coupling apparatus.
Week 7	Lab 7: Types of insect larvae and pupae female reproductive systems in insects
Week 8	Lab 8: Dissection of digestive system in insects (Grasshopper)
Week 9	Lab 9: Dissection of male and female reproductive systems in insects (Grasshopper)
Week 10	Lab exam; Completion of insect collections
Week 11	Lab 11 : The Circulatory System
Week 12	Lab 12 : Structure and Function of the Reproductive System
Week 13	Lab 13: Organization and Structure of the Tracheal System 1) Tracheae and Tracheoles 2) Spiracles
Week 14	A reviewing for Exam
Week 15	Exam

Learning and Teaching Resources		
مصادر التعليم والتدريس		
	Text	**Available in the Library?**
Required Texts	• Chapman, R., 1990. The insect: structure and function: The English language. *Bristol, UK: Book Society and Hodder and Stoughton, Great Britain*. • Gillott, C., 2005. *Entomology*. Springer Science & Business Media. • Gullan, P.J. and Cranston, P.S., 2014. The insects: an outline of entomology. John Wiley & Sons.	No
Recommended Texts	• Barnard, P.C., 2011. *The royal entomological society book of British insects*. John Wiley & Sons. • Packard, A.S., 1898. *A Text-book of Entomology: Including the Anatomy, Physiology, Embryology and Metamorphoses of Insects, for Use in Agricultural and Technical Schools and Colleges as Well as by the Working Entomologist*. Macmillan.	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	التقدير	(45-49)	More work required but credit awarded
	F – Fail	امتياز	(0-44)	Considerable amount of work required
Note:				

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.