Department of Plant Protection

College of Agricultural Engineering Sciences

University of Salahaddin

Subject: Advanced Insect Morphology

Course Book – (Higher Diploma's Level)

Lecturer's Name: Dr. Pshtiwan Abdullah Jalil

Academic Year: 2023-2024

Course Book

1. Course name	**Advanced Insect Morphology**
2. Lecturer in charge	**Pshtiwan Abdullah Jalil, PhD**
3. Department/ College	**Plant Protection Dept./Agricultural Engineering Sciences College.**
4. Contact	**e-mails: Pshtiwan.jalil@su.edu.krd** **Tel: 0750 4823304**
5. Time (in hours) per week	**Sunday, Theory (2) and Practically (2) hrs./week**
6. Office hours	**8:30 – 2:00 from Sunday to Thursday**
7. Course code	
8. Teacher's academic profile	**Personal information:** Date of Birth: 1-1-1982 Place of Birth: Kirkuk Nationality: Iraqi Marital Status: Married Sex: Male **Education and certifications:** **Pshtiwan Abdullah Jalil,** I Achieved a Doctor of Philosophy (Ph.D.) in Entomology/Molecular Insect Taxonomy, accomplished from Salahaddin University, Erbil, Kurdistan Region-Iraq, 2020. My dissertation title was "Taxonomic and molecular study of some flat-headed borers (Coleoptera: Buprestidae) occurring across Erbil Province, Kurdistan Region-Iraq". I got a Master of Science in Economic Insects on horticultural crops, entitled "Biological and Ecological Study of the small cabbage white butterfly, *Pieris rapae* L. (Lepidoptera: Pieridae) on the cabbage and cauliflower in Gradarasha Research Station, Erbil Province, Kurdistan Region-Iraq". In College of Agricultural Engineering Sciences, Salahaddin University, Erbil, 2011.
9. Keywords	Insect structure, Modification of insect antenna, Insect Mouthpart, Legs, Wings, Wing coupling, Seta, Cuticle, Abdominal appendages.

10. Course overview:

This course guide explains what to expect from reading the subject of Insect Morphology in advance. The study of this subject is not only of theoretical importance, but it is the basis of your understanding and knowledge of the fundamentals that guide for separation between insect orders and insect genders. Studying this subject is an important for learning the insect structures and morphological characteristics clearly. This is because the adoption of diagnostic characteristics involves mouthpart modification, Antenna and leg modification, and wing venation. The course introduces students into knowledge about insect morphology and insect. Structure, externally and internally.

11. Course objective:

After finishing this course, the students should be able to:

- Explain the evolution of insects, list the general characteristics of insects and align it with factors that contribute to their success in the environment.
- Identify common insect species using their basic features and classify species into their respective families and orders, as well as bring out similarities of the same species.
- Types of the mouth parts, legs, wings and their modifications in the insect body for different functions.
- Describe the individual organ systems, which have taxonomic important to achieve the overall process, including description, morphometric, and anatomy.
- Identify the most insect orders and illuminating of the main characteristics of the family, genus and species separately.

12. Student's obligation

The students should attend regularly for all lectures throughout the course. By being present and on time, students can be actively involved in the learning process, participate in lessons, and benefit from class activities, and writing notes. Additionally, students should come prepared for daily quizzes and actively contribute to class discussions to enhance their conception and critical thinking skills. Also, there are many important things such as taking part in practical parts in department labs and completing all tests, exams, assignments, and weekly reports.

13. Forms of teaching

The teaching method is important for providing students with an inclusive and interesting education. The following methods of teaching will be followed.

1- PowerPoint presentations: To give a summary of the lecture in the course, we will utilize data show presentations in the form of PowerPoint slides. Also, extra detailed information will be given through narration, while the slides will define the practice of each lecture.

2- Using a whiteboard: A whiteboard is also required for teaching and explaining different topics, and certain examples.

3- Practical dissection: For the observation of insect systems and organs practical dissecting will be performed in Entomology labs.

14. Assessment scheme

Students must pass mid-term exams, is worth 50 marks, and the final exam is worth 50 marks.

15. Student learning outcome:

Through the end of this course, students should be able to:

- Demonstrate an inclusive understanding of insect morphology basics and principles.
- The structure of each insect system.
- Utilize practical methods for dissection process Successfully.
- Observation of all diagnostic characteristics of each class of Arthropoda.
- Understanding the shape and sclerotization of each insect part and organ.

16. Course Reading List and References:

- The following textbooks and references are recommended for further reading:

Beutel, R.G., Ge, S.-Q. & Hörnschemeyer, T. 2008. On the head morphology Tetraphalerus, the phylogeny of Archostemata and the basal branching events in Coleoptera. Cladistics 24: 270–298.

Beutel, R.G., Kristensen, N.P. & Pohl, H. 2009. Resolving insect phylogeny: The significance of cephalic structures of the Nannomecoptera in understanding endopterygote relationships. Arthropod Structure & Development 38: 427–460.

Chapman R. F. 2013. The Insects: Structure and Function, 5th Edition. Book.

Fortes, P., Salvador, G. & Cônsoli, F.L. 2011. Ovary development and maturation in *Nezara viridula* (L.) (Hemiptera: Pentatomidae). *Neotrop. Entomol*. 40(1):89-96.

Homberg, U. (1987). Structure and functions of the central complex in insects. In Arthropod Brain, ed. A.P. Gupta, pp. 347–67. New York: Wiley

Özyurt, N., Candan, S. & Suludere, Z. 2014. The morphology and histology of the male reproductive system in *Apodiphus amygdali* (Germar,1817) (Heteroptera: Pentatomidae). Life: *The Excitement of Biology*, 2(1): 31-41.

Terra W.R. and Ferreira C. 2009. Digestive System. In: Vincent H. Resh and Ring T. Carde, Editor(s), Encyclopedia of Insects (Second Edition), Academic Press, San Diego. Pages 273-281.

17. The Topics:	Lecturer's name
1. The characteristics of class insecta **2. The Integument system** • Digestive system (alimentary tract) • Energy metabolism • Fat body (not from the book) **3. Insect mouthpart** **4. Insect Antenna and its modification** **5. Insect Legs and its modification** **6. Insect wing and its modification** **7- Wing coupling** **8- Abdomen** **9- Abdominal Appendages** **10. Reproductive systems**	

18. Question forms

1. **Definitions**, clavate antenna, hypognathous mouthpart, Tarsomeres, hamulate, aristate.

2. **Explanations**, such as:

- What is the difference between a forgut, and a midgut?

- Compare between
  - Pectinate, and bi-pectinate antenna.
  - Pilose & Plumose
  - Prognathous & Opisthognathous
- Write the main composition of the insect cuticle.
- Write the main characteristics of phylum Arthropoda.
- What is sclerotization? and write its phases.
- Write the main sections of mouthpart with drawing.

19. Extra notes:

- When an exam postponed by a student, whatever be the reason, he/she has to do the exam within one week. It is the student's responsibility to contact the subject lecturer and the department presidency with the frame time to rearrange for an alternative exam. Failure to do so in a timely way may result in an uncounted grade for the missed exam.

20. Peer review پێداچوونەوەی هاوەڵ

I hereby approve that the course is comprehensive and covers all aspects of the course. The subject is arranged sequentially which enables the students to learn gradually step by step.

Name:

Degree:

Specialty:

Signed:

Date: