**Ministry of Higher Education and Scientific **

 **Research/Iraqi Kurdistan Region**

 **University of Salahaddin /College of Agriculture**

 **& Engineering/ Department Of Plant Protection.**

**Course book**

**Department: Plant Protection**

**Subject: Theoretical & practical**

**Insect Physiology / 3rd  Year**

 **Semester : Fall/ 8hours/week**

**Lecturer: Miss Shatha H. Ahmed**

**Miss: Waran N. Abdullah Agha**

**Academic Year: 2023 - 2024**

**Course Book**

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| **1. Course name** | **Theorical Insect Physiology****Practical Insect Physiology** |
| **2. Lecturer in charge** | **1- Dr. Shatha H. Ahmed****2- Mrs. Waran N. Abdullah Agha** |
| **3. Department/ College** | **Plant protection\ Agriculture** |
| **4. Contact** | **E-mail:shatha\_alsofy@yahoo.com/ shatha.ahmed@su.edu.krd****Mobile: +9647504301734****E-mail: waran.agha@su edu.krd****Tel: (optional):** **0750 4198268** |
| **5. Time (in hours) per week** | **For example Theory: 2 & practical 6** |
| **6. Office hours** | **Daily from 8:30 to 2:30** |
| **7. Course code** |  |
| **9. Keywords** | **1-Plant Protection, Entomology, Insects physiology .****2-Principles of insect collection and techniques, Insect integument, Digestive system , Respiratory system, Circulation of hemolymph, Physiological functions** |
| **10. Course overview:****1- Insect Physiology is a branch of Entomology which focuses in studying different systems and organs of insects and the position of each organ inside the body.****The fundamental concepts in this subject are: explaining the role of body wall in protecting inside insect from outside environment and enemies, also studying their structure.****It's very important to inform students about the digestive system of insects, their parts and function of each part in digesting of food, how food passes through the alimentary canal, and comparing between different insects in terms of their food depending on the kind mouthparts.****These information will support the knowledge of students about the related subjects, for example; how insects feeding, how could survive without food in the winter, and furthermore by getting information about the structure of cuticle and the nerve system, these information will increase their knowledge about how to control insects.****By the end of this course the student will be familiar with anatomic insects and the position of each system and organ of insects.****2- This course will focus on identification of insect outer and inner body parts and the function of each interior organ or systems from the insect body, Emphasis will be on important experiments on the most systems from the insect body and some environmental physiology studies such as impact of temperature, humidity and light on the insects live, with some physiological cases like diapause, dormancy, and migration.****11. Course objective:****1- The current course aims to focus on informing the students about the main systems and organs of body insects.****Allow the student to get knowledge about the position, structure and the functions of each part. The differences between insects and other invertebrates in related to the structure and functions of some organs.****2-**a- Understand the functions and structures involved in selected physiological systems ininsects.b- Learn basic principles of the mechanics of physiological systems so that you can learninsect physiology on your own when necessary.c- Become familiar with some basic techniques in physiology of organs and systems so you canbetter understand their application.d- Know how insect physiology applies to your sub-field in entomology and draw from thisdiscipline to enhance your own work. |
| **12. Student's obligations:-****1- The student must have an important role:****The students must contribute in the scientific discussions in the class or teaching hall.****The students must know the importance of quizzes, homework, reports and exams.****It is necessary to contribute the student in presenting a scientific subject.**2- There are many thing important in in academic year:- attendance and completion of all tests, exams, assignments, reports , quizzes …etc… |
| **13. Forms of teaching**1- Usage of different forms of teaching:**Datashow and power point.****Explainig & asking.****White board.**2- Teaching methods are ,using data show ways ,power point, white board, giving hand note, video reports**.** |
| **14. Assessment scheme****1- The course degree was divided as follow 15% of Theorical part , 35% for Practical part.****15% for theoretical part 10 marks for the 1st & 2nd Exam, 5 marks for daily quizzes and reports.****35% for practical part in theoretical part 10 marks for the first exam , 10 marks for second exam , 5 marks for daily quizzes , reports & samples.****Final exam 50%, 15 marks for theory and 35 for practical test**.**2-** **Marks distribution of 15%**(Theory)

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| Test | Mark 15% |
| Monthly Examination | 10 |
| Weekly Quiz | 3 |
| Report | 2 |
| Total | 15 |

Marks distribution of 35% (Practical)

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| Monthly exam | 20 |
| Quizzes | 5 |
| Reports | 5 |
| Samples | 5 |

Final examination out of (50%) |
| **15. Student learning outcome:****1- Course outcomes should clearly relate to topics, assignments, and exams that are covered in the present course. Course outcomes should be clear, measurable, use verbs (e.g., identify, explain,..).****2-**a- Important of Insect physiologyb- Important of modifications of insect systems and organs.c-How insect survive and tolerant with their ecosystems.d-Detection of insect behavior and reproduce.e- How insect are attract and attach and the mode of injury with agriculture products. |
| **16. Course Reading List and References‌:****1-****1-R.F. Chapman., “*The insects, Structure and function”,* Cornell University, New york, 7th Ed., 2012****2-V. B. Wigglesworth F.R.S., “*Insect Physiology”,* University press, Cambridge, Eighth Ed., 1984****3-James L. Nation. Sr., “*Insect Physiology and Biochemistry”*, third Ed., 2002.****4-Marc. J. Klowden., “*Physiological Systems in Insects”*, Academic press in an imprint of Elsevier, third Ed., 2013.****5- Kenis, M.; Hurley**, B.P.; **Colombari,** F**.; Lawson**, S.; **Sun**, J.; **Wilcken,** C.; Weeks, R. and **Sathyapala**, S. 2019. Guide to the classical biological control of insect pests in planted and natural forests, FAO Forestry Paper No. 182. Rome, FAO. Licence: CC BY-NC-SA 3.0 .**6-** **Russell, J.** PHYSIOLOGY AND MAINTENANCE . *Insect Physiology* . *©Encyclopedia of Life Support Systems (EOLSS* )http://www.eolss.net/Eolss-sampleAllChapter.aspx**2-**

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| 1- | **Chapman, R.F. 1998.** The Insects, Structure and Function, 4th Ed.Cambridge University Press, UK.770 pp. |
| 2- | **Gullan, P.J. and P. S. Cranston(2005) .** The Insects an outline of Entomology. Department of entomology, University of California, Davis, USA, 505pp. |
| 3- | **Klowden, M.J. 2007.** Physiological Systems in Insects, Second Edition Academic Press, San Diego, CA, 415 pp. |
| 4- | **Nation, James L. 2002.** Insect Physiology and Biochemistry. CRC Press, Boca Raton, 485 pp. |
| 5- | **Nijhout, H.F. 1981.** Physiological control of molting in insects. American Zoologist. 21:631-640.      |
| 6- | **Richards, O. W. and R. G. Davis (1978).** Imms outline of entomology. London,Newyork. Chapman& hill. 450pp. |
| 7- | **Simpson, S.J., D. Raubenheimer, and P.G. Chambers. 1995.** The mechanisms of nutritional homeostasis. Pp 251-278. |
| 8- | **Truman, J.W., and L.M. Riddiford. 1999.** The origins of insect metamorphosis. Nature. 401:447-452. |
| 9- | **Yin, C-M., W-H Quin, and J.G. Stoffolano Jr. 1999.** Regulation of mating behavior by nutrition and the corpus allatum in both male and female *Phormia regina*  (Meigen). Journal of Insect Physiology,45:815-822. |
| 10- | Underwood, D. L. A.**2015** Internal anatomy and physiology, Biology 316 - General Entomology. |

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| **17. The Topics:** | **Lecturer's name** |
| 1-1st week Introduction , The Body wall of insects.2nd week. The external anatomy of insects.3rd week The Digestive system of insects.4th week The mechanism of Digestive system.5th week The Circulatory System.6th week The 1st exam.7th weekImmunity in insects – innate immunity.8th week The Nerve system, Its structure & function.9th week The Respiratory system of insects.10th week The Reproduction system, male and femalereproductive systems.11th week The 2nd exam.12th week the Muscular system of insects.13th week The Endocrine system of insects.14th 1 14th The pheromones of insects, Structures & functions.15th 15th Diapause& Dormancy of insects.1**2-****1st. Week:** Introduction and general information about the course and the subject.**2nd Week:** Integument, layers and their function**3rd Week:** External morphology of insects**4th Week:** Internal anatomy of insects/Digestive system**5th Week:** Exam**6th Week:** Circulation system**7th Week:** Respiration system**8th Week:** Excretion system**9th Week:** Nervous System**10th Week:** Sensory structures and systems**11th Week:** Muscle Systems**12th Week:** Environmental Physiology**13th Week:** Exam**15th Week:**, Hybernation and Migration | Dr. Shatha H. AhmedEx:2 hours + 6 hoursMiss..Waran Nooraldeen Ex.6 hours. |
| **18. Practical Topics (If there is any)** |  |
| 1. **There are three main and important skills the students should learn they are power pint , excel and world that led them dealing with computer and internet.**
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| **19. Examinations:****1- Questions samples.*** **Compositional:**

a-Definition?b-Explaination?c- What are the differences between.. ?d- Fill-in the blanks?* **True or false type of exams**?
* **Draw the diagram,Scheme , Structure of………….?**

**Q1/Identify this specimen.****a-Name of appendages****b-Injurious part****c-Function of this par****Q2/Describe this image.****Q3/ Write the type of modification in this section.****Q4/Draw a diagram for explain the……………system of insects.****Q5/Lable this diagram.** |
| **20. Extra notes:****2-** With the best wishes to the development of Lab. In the. Department. |
| **21. Peer review پێداچوونه‌وه‌ی هاوه‌ڵ**.‌‌ |