DISCIPLINE SPECIFIC ELECTIVE COURSE -20

Applied Entomology

Zoo-DSE-20

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisites of the course (if any)
		Lectures	Tutorial	Practical / Practice		
Applied Entomology **Zoo-DSE-20**	**4**	**3**	**0**	**1**	**As per the Program Eligibility**	**Basic understanding of Insect Biology and Animal World.**

Learning Objectives:

The learning objectives of this course are as follows:

- To impart in-depth knowledge about various aspects of the insect world.
- To gain theoretical and practical knowledge of experimental techniques using insects as research models.
- To understand the immense role of insects as ecosystem providers.
- To gain theoretical and practical knowledge of insects as pests and their economic impact.
- To explore pest management measures which are effective, economical and eco-friendly.

Course Learning Outcome:

Upon completion of the course, students will be able to:

- Learn about the fascinating world of insects from a holistic perspective.
- Learn about the biology of insects.
- Understand the difference between various types of beneficial and destructive insects.
- Gain knowledge about important insect pests of crops, fruits, vegetables, stored grains, and of medical importance.

- Analyze the advantages and limitations of the various pest management measures and then design/ customize more effective measures by targeting the lacunae in the existing methods of pest management and by integrating the various aspects of Integrated Pest Management (IPM).

SYLLABUS OF DSE-20

THEORY **45 hrs**

Unit 1: Exploring the Fascinating World of Insects. **10 hrs**

Overview of the economic importance of insects: Beneficial insects (Honey bees, Silkworm, Lac insect, ecosystem service providers: flesh flies, dung beetles, termites); Insect pests of agricultural crops, stored grains, medical and household; Insects as forensic agents: role of insects/arthropods in criminal investigation by predicting time and cause of death.

Unit 2: Co-evolution of insects and plants **5 hrs**

Insect-plant relationships, Mechanisms of insect resistance in plants, Tri-trophic interactions (Plant-insect pest-natural enemies).

Unit 3: Bionomics of Insect Pests **18 hrs**

Agricultural Crops and Stored grains: Pest, Economic threshold (ET), Economic injury level (EIL), classification of pests; Identification, seasonal history, nature of damage, life history and control of pests of rice: *Leptocorisaacuta;* pulses: *Helicoverpaarmigera*; Sugarcane: *Scirpophaganivella*; Cotton: *Eariasvitella*; Vegetables: *Raphidopalpafoveicollis*; Fruits: *Papiliodemoleus*, Stored grains: *Sitophilus oryzae*, *Corcyra cephalonica*, *Callosobruchuschinensis*. Medical pests: Mosquitoes, lice, fleas, house fly, cockroach, and termites

Unit 4: Pest Management Methods **12 hrs**

Physical, Cultural, Chemical, Biological, Microbial, Genetic (SIT, F_1 sterility, etc.), Biotechnological, and Bio-rational methods (using pheromones, JH mimics, MH agonists, etc.) in pest management. Integrated Pest Management (IPM) and Integrated Vector Management (IVM).

PRACTICALS : 30 hrs

(Laboratory periods: 15 classes of 2 hours each)

1. **Study of morphology, growth and development of insect pests**
   (a) Rearing of a hemimetabolous [(e.g. Red cotton bug, *Dysdercuskeonigii*)/ holometabolous (e.g. pulse beetle, *Callosobruchuschinensis*)] insect pest in the laboratory. Submission of life cycle stages and details on its biology, economic importance, and appropriate pest management method.

(b) Study of life history stages of insect pests of medical and household importance – mosquitoes (*Anopheles, Culex*, *Aedes*), lice, sand fly, flea, house fly, cockroach (*any four*). Submission of life cycle stages and details on its biology, economic importance, and appropriate pest management method.

2. **Insect Toxicology:**
   (a) Estimation of LD_{50} and LC_{50} of insecticides using mosquito larvae/ given data.
   (b) Pesticide residue analysis of contaminated soil/vegetable/water samples using TLC.

Project work/ Field visits

1. Field survey of beneficial insects and insect pests. Submission of geo-tagged photographs captured in different locations, with details of field observations.
2. Visit to the labs and/or fields. Submission of a field report.

Essential/recommended readings:

1. Atwal, A.S. (1993) Agricultural Pests of India and South East Asia. Kalyani Publishers, New Delhi.
2. Dennis, S. Hill (2005). Agricultural Insect Pests of the Tropics and Their Management, Cambridge University press.
3. Metcalf, C. L., Flint, W.P. and R.L. Metcalf (1962). Destructive and Useful Insects: their habits and control, 4th Ed. Mc Graw-Hill.
4. Pedigo, L. P. (2002). Entomology & Pest Management, Prentice Hall, New Jersey, USA.
5. Service, M. (2012). Medical Entomology for students, Cambridge University Press, UK.

Suggested Readings:

1. S. Pradhan (1998) (Reprint 2023). Insect Pest of Crops. National Book Trust, New Delhi.
2. Schoonhoven, L. M., van Loon, J.A., &Dicke, M. Insect Plant Biology (2005). Oxford University Press, USA.
3. Jolivet, P. (1998). Interrelationship between insects and Plants, CRC Press, USA.
4. Norris, Caswell-Chen and Kogan, M. (2002). Concepts of IPM, Prentice-Hall, USA.

NOTE: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.