

Department of Zoology

University of Allahabad

Choice Based Credit System Syllabus

(Agricultural Zoology & Entomology)

Semester I

AZE 501: Biostatistics

UNIT I

Population sample, random sample, tabular and graphical representation of data.

UNIT II

Mean and standard deviation of grouped and ungrouped data

Probability, relative frequency

UNIT III

Probability distribution

Normal Distribution

UNIT IV

Tests of significance- Student's t test

Analysis of Variance

UNIT V

Correlation

Linear regression

AZE 502: Plant Nematodes

UNIT I

Plant parasitic nematodes, their pathogenecity, symptoms of infection and control methods. Morphology, life history, damage and control of plant nematode, *Heterodera*

UNIT II

Morphology, life history, damage and control of plant nematode, *Meloidogyne*

UNIT III

Morphology, life history, damage and control of plant nematode, *Anguina*, *Aphelenchoides*

UNIT IV

Morphology, life history, damage and control of plant nematode, *Radopholus*

UNIT V

Morphology, life history, damage and control of plant nematode, *Pratylenchus* and *Ditylenchus*.

AZE 503: Invertebrates of Agricultural Importance

UNIT I

Annelieds of agricultural importance such as earthworm and leech.

UNIT II

Morphology, anatomy and life history of *Pheretima* and *Hirudinaria*, Vermicomposting.

UNIT III

Molluscs of agricultural importance, their life history and control (Land snails, slugs etc.)

UNIT IV

Soil arthropods and their classification and habitats Effect of soil arthropod activity on soil properties.

UNIT V

Role of soil arthropods in detritus feeding, litter breakdown and humus formation. Soil arthropods as bio-indicators of habitat qualities.

AZE 504: Vertebrates of Agricultural Importance

UNIT I

Common Indian birds of agricultural importance such as *Corvus* spp., *Psittacula cyanocephala* and *Passer domesticus*, with special reference to their biology, nesting, feeding habits and damage to agricultural produce.

UNIT II

Common Indian birds of agricultural importance such as *Columba livia*, *Gymnorhinus xanthocollis* with special reference to their biology, nesting, feeding habits and damage to agricultural produce.

UNIT III

Bird migration, birds as pest of agriculture, their control. Birds as enemies of insects, agriculture and economic importance of birds.

UNIT IV

Mammals of agricultural importance such as monkeys, nilgai, squirrels, toddy cat with reference to their biology, feeding habits, damage and control.

UNIT V

Rats, their biology, life history and control methods.

AZE 531: Lab Course/Practical

Semester II

AZE 505: Medical Entomology

UNIT I

Common insects and arthropods attacking ,annoying man and affecting his health

Mode of transmission of pathogens by insects, Myiasis

UNIT II

The biology, life history, mode of attack, type of injury or infection, diseases, treatment and control of mosquitoes, sand flies, blackflies.

UNIT III

The biology, life history, mode of attack, type of injury or infection, diseases, treatment and control of house fly, blow flies, tsetse fly

UNIT IV

The biology, life history, mode of attack, type of injury or infection, diseases, treatment and control of human flea (*Pulex irritans*), *Xenopsylla cheopis*

UNIT V

The biology, life history, mode of attack, type of injury or infection, diseases, treatment and control of *Pediculus humanus*, and bed bug (*Cimex hemipterus*)

AZE 506: Veterinary Entomology

UNIT I

Common insects and arthropods attacking, annoying, or affecting the health of cattles, horses, pigs, sheep, goat and poultry.

The biology, life history, mode of attack, nature of injury and infection, damage or loss, treatment and control of horse flies (*Tabanus*), stableflies (*Stomoxys morsitans*),

UNIT II

The biology, life history, mode of attack, nature of injury and infection, damage or loss, treatment and control of buffalo fly (*Lyperosia exigua*), cattle ked (*Hippobosca spp.*), cattle biting louse (*Damalinia bovis*)

UNIT III

The biology, life history, mode of attack, nature of injury and infection, damage or loss, treatment and control of cattle blood sucking lice (*Linognathus vituli*, *Haematopinus*) and cattle warblefly (*Hypoderma bovis*)

UNIT IV

The biology, life history, mode of attack, nature of injury and infection, damage or loss, treatment and control of equine botflies (*Gasterophilus intestinalis*) and fowl tick (*Argas persicus*)

UNIT V

The biology, life history, mode of attack, nature of injury and infection, damage or loss, treatment and control of cattle tick (*Boophilus microplus*), chicken mite (*Dermanyssus gallinae*)

AZE 507: Classification of Insects

UNIT I

History of Insect classification. Discussion on views pertaining to classification of insects. Procedures in taxonomy, International rules of Nomenclature. Classification and diagnostic character of the orders: Thysanura, Orthoptera, Dermaptera, Isoptera, Anoplura

UNIT II

Classification and diagnostic character of the orders: Odonata, Thysanoptera, Hemiptera,

UNIT III

Classification and diagnostic character of the orders Lepidoptera, Coleoptera, Hymenoptera and Diptera.

UNIT IV

Distinguishing characters, general biology, habits and habitats of the economically important families contained in these orders.

UNIT V

Methods of collection, killing, preserving, pinning, setting and handling and rearing.

AZE 508: Insect Ecology

UNIT I

Abiotic Environment: Effect of temperature, light and water on insect population.

UNIT II

Biotic Environment: Food and trophic relationships

Insect-Plant interactions, Insect-Plant mutualism

UNIT III

Interactions between insects and other animals

Interspecific interactions: competition and coexistence, Predator-prey relationships

UNIT IV

Inter specific relation (Parental care, Social life etc.)

UNIT V

Insect population and pest out breaks

AZE 532: Lab Course/Practical

Semester III

AZE 509: Insect Morphology

UNIT I

External morphology of the insect's body i.e. head, thorax and abdomen, their appendages and function

UNIT II

Insect integument and its derivatives

Structure of insect cuticle and its function

UNIT III

Head: origin, type, structure, types of mouth parts and antennae

UNIT IV

Thorax: Areas and sutures of tergum, sternum and pleuron, pterothorax; wings: structure and modification, wing venation, wing coupling apparatus; Legs: structure and modifications

UNIT V

Abdomen: Segmentation and appendages, genitalia and their modifications

Stridulatory organs and sound producing organs.

AZE 510: Reproduction and Development

UNIT I

Structure of gonads (ovary and testis) of insects

Types of ovarioles found in insects

UNIT II

Unusual types of development

Diapause

UNIT III

Major facts of embryology, Structure of insect egg, blastoderm formation, germ band and formation of three germ layers. Blastokinesis

UNIT IV

Various types of larvae and pupae, significance of pupal stage in insects. Insect Metamorphosis

UNIT V

Life histories of representative types (Housefly, butterfly, moth, cockroach, red cotton bug etc.).

AZE 511: Economic Entomology

UNIT I

Biology, nature, extent of damage and control of pests of paddy, pulses, oil seeds

UNIT II

Biology, nature, extent of damage and control of vegetables, sugarcane, cotton, tobacco, etc.

UNIT III

Pests of stored products

UNIT IV

Polyphagous pests like locusts, termites,

UNIT V

Polyphagous pests like white grubs and hairy caterpillar

Insects in relation to plant diseases.

AZE 512: Pest Control

UNIT I

Natural and applied control

Cultural, Mechanical, Physical, Legal control and biological methods of pest control

UNIT II

Recent trends in pest control: Ionizing radiations, chemosterilants, Attractants, Repellents

UNIT III

Antifeedants, Semiochemicals, Integrated Pest Management (IPM)

UNIT IV

Hormones and neuropeptides, Insect growth regulators, juvenile hormone and moulting hormone analogues

UNIT V

Third generation pesticides, Fourth generation pesticide

AZE 533: Lab Course/Practical

Semester IV

AZE 513: Insect Toxicology

UNIT I

Insecticide formulations, Mode of action of insecticides, classification of insecticides

UNIT II

Study of different types of insecticides- inorganic, botanical insecticides, chlorinated hydrocarbons, organophosphates, carbamates.

UNIT III

Methods of application of insecticides and various types of appliances used for insect control.

UNIT IV

Fumigants, Systemic insecticides

Insecticide resistance in insects

Insecticide residues, Factors influencing effectiveness

UNIT V

Basic concept involved in choosing pesticides in IPM

Hazards of insecticides, first aid precautions and antidotes.

Pesticides and environment

Note: The candidate may opt any two of the following electives

AZE 551: Insect Endocrinology

UNIT I

Endocrine glands, their structure and function, Entocones

UNIT II

Hormones- Survey of insect hormones, metamorphosis hormone, activation hormone, neurosecretory cells, Bursicon

UNIT III

Moulting hormone, juvenile hormone, Eclosion hormone

UNIT IV

Paper factor,

Anti-allatins

UNIT V

Hormonal control of moulting and metamorphosis, Hormonal control of reproduction in insects.

AZE 552: Insect Physiology

UNIT I

Alimentary canal and physiology of digestion in insects

Role of microorganisms in nutrition and digestion in insects

UNIT II

Structure and function of Malpighian tubules

UNIT III

Structure and function of insect spiracle

Respiration in aquatic and endoparasitic insects.

UNIT IV

Structure and function of Haemocytes

UNIT V

Transmission of nerve impulse

Structure and function of fat body

AZE 553: Commercial Entomology

UNIT I

Study of different species of silkworms, life history of silk worm and its characteristic features

UNIT II

Silk and its uses, diseases of silkworms, rearing and management of silkworms.

UNIT III

Study of different species of honey bees, life history

UNIT IV

Bee keeping, diseases of honey bees. Bee poisoning. Production and marketing of quality honey and value added honey products. Establishment and maintenance of apiaries.

UNIT V

Lac insect- lac culture, natural enemies and their management.

AZE 554: Project Work/Seminar/Training Programme

AZE 534-538: Lab Course/Practical

