

RAYALASEEMA UNIVERSITY, KURNOOL

Zoology Syllabus for Semester -V- 2022-23

REVISED UG SYLLABUS UNDER

CBCS

Semester-V

(To choose one pair from the four alternate pairs of SECs)

UnivCode	Course Number	Name of Course
	6A	SUSTAINABLE AQUACULTUREMANAGEMENT
	7A	POST HARVEST TECHNOLOGYOF FISH AND FISHERIES

OR

	6B	LIVE STOCK MANAGEMENT-I (BIOLOGY OF DAIRY ANIMALS)
	7B	LIVE STOCK MANAGEMENT -II(DAIRY PRODUCTION AND MANAGEMENT)

OR

	6C	POULTRY MANAGEMENT- I(POULTRY FARMING)
	7C	POULTRY MANAGEMENT- II (POULTRY PRODUCTION AND MANGEMENT)

OR

	6D	SERI CULTURE -I
	7D	SERI CULTURE -II

Note: For Semester-V, for the domain subject Zoology, any one of the four pairs of SECs shall be chosen as courses 6 and 7, i.e., 6A & 7A or 6B & 7B or 6C & 7C or 6D & 7D. The pair shall not be broken (ABCD allotment is random, not on any priority basis).

RAYALASEEMA UNIVERSITY, KURNOOL

Zoology Syllabus for Semester -V- 2022-23

Course: 6 A: **SUSTAINABLE AQUACULTURE MANAGEMENT**
Teaching Hours: 60. Max. Marks: 100

Unit: 1

- 1.1 Present status of Aquaculture – Global and National scenario
- 1.2 Major cultivable species for aquaculture: freshwater, brackish water and marine.
- 1.3 Traditional, extensive, modified extensive, semi-intensive and intensive cultures of fish and shrimp.
- 1.4 Design and construction of fish and shrimp farms

Unit: 2

- 2.1 Functional classification of ponds – head pond, hatchery, nursery ponds
- 2.2 Functional classification of ponds -rearing, production, stocking and quarantine ponds
- 2.3 Need of fertilizer and manure application in culture ponds
- 2.4 Physio-chemical conditions of soil and water optimum for culture (Temperature, depth, turbidity, light, water, PH, BOD, CO₂ and nutrients)

Unit: 3

- 3.1. Induced breeding in fishes
- 3.2. Culture of Indian major carps: Pre-stocking management (Dewatering, drying, ploughing/desilting; Predators, weeds and algal blooms and their control, Liming and fertilization)
- 3.3. Culture of Indian major carps - Stocking management
- 3.4. Culture of Indian major carps - post-stocking management

Unit: 4

- 4.1 Commercial importance of shrimp & prawn
- 4.2 *Macrobrachium rosenbergii*- biology, seed production.
- 4.3 Culture of *L. vannamei* – hatchery technology and culture practices

4.4 Mixed culture of fish and prawns

Unit: 5

5.1 Viral diseases of Fin Fish & shell fish

5.2 Fungal diseases of Fin & Shell fish

5.3 Bacterial diseases of Finfish & Shell fish

5.4 Prophylaxis in Aquaculture.

Course: 6 A: SUSTAINABLE AQUACULTURE MANAGEMENT PRACTICAL SYLLABUS (30hrs) (Max.50Marks)

1. Fresh water Cultivable species any (Fin & Shell Fish Specimens – Observation of morphological characters by observation and drawings)-5
2. Brackish water cultivable species (Fin & Shell fish- Specimens- Observation of Morphological Character by observing drawing) -5
3. Hands on training on the use of kits for determination of water quality in aquaculture (DO, Salinity, pH, Turbidity- Testing kits to be used for the estimation of various parameters/ Standard procedure can be demonstrated for the same)
4. Demonstration of Hypophysation(Procedure of hypophysation to be demonstrated in the practical lab with any edible fish as model)
5. Viral diseases of Fin & Shell Fish (Observation of his to pathological slides / Charts/ Models of viral pathogens in fin/ shell fish – one edible specimen can be used for observation of same in the laboratory)
6. Bacterial diseases of Fin & Shell Fish (Observation of his to pathological slides / Charts/ Models of Bacterial pathogens in fin/ shell fish – One edible specimen can be used for observation of same in the laboratory)
7. Fungal diseases of Fin & Shell Fish (Observation of his to pathological slides / Charts/ Models of Bacterial pathogens in fin/ shell fish – One edible specimen can be used for observation of same in the laboratory)

Course 7 A: **POSTHARVEST TECHNOLOGY OF FISH AND FISHERIES**
Teaching Hours: 60. Max. Marks: 100

Unit – I Handling and Principles of fish Preservation

- 1.1 Handling of fresh fish, storage and transport of fresh fish, post mortem changes (rigor mortis and spoilage), spoilage in marine fish and freshwater fish.
- 1.2 Principles of preservation – cleaning, lowering of temperature, rising of temperature, denudation, use of salt, use of fish preservatives, exposure to low radiation of gamma rays.

Unit – II Methods of fish Preservation

- 2.1 Traditional methods - sun drying, salt curing, pickling and smoking.
- 2.2. Advanced methods – chilling or icing, refrigerated sea water, freezing, canning, irradiation and Accelerated Freeze drying (AFD).

Unit – III Processing and preservation of fish and fish by-products

- 3.1 Fish products – fish minced meat, fish meal, fish oil, fish liquid (ensilage), fish protein concentrate, fish chowder, fish cake, fish sauce, fish salads, fish powder, pet food from trash fish, fish manure.
- 3.2 Fish by-products – fish glue, Using glass, chitosan, pearl essence, shark fins, fish Leather and fish maws.

Unit – IV Sanitation and Quality control

- 4.1 Sanitation in processing plants - Environmental hygiene and Personal hygiene in processing plants.
- 4.2 Quality Control of fish and fishery products – pre-processing control, control during processing and control after processing.

Unit – V Quality Assurance, Management and Certification

- 5.1. Seafood Quality Assurance and Systems: Good Manufacturing Practices (GMPs); Good Laboratory Practices (GLPs); Standard Operating Procedures (SOPs); Concept of Hazard Analysis and Critical Control Points (HACCP) in seafood safety.
- 5.2 National and International standards – ISO 9000: 2000 Series of Quality Assurance System, *Codex Alimentarius*.

Course 7 A: POSTHARVEST TECHNOLOGY OF FISH AND FISHERIES
PRACICAL SYLLABUS

1. Evaluation of fish/ fishery products for organo leptic, chemical and microbial quality.

2. Preparation of dried, cured and fermented fish products

For detailed procedure method visit sites:

3. Examination of salt, protein, moisture in dried / cured products

4. Examination of spoilage of dried / cured fish products, marinades, pickles, sauce.

5. Preparation of isinglass, collagen and chitosan from shrimp and crab shell.

6. Developing flow charts and exercises in identification of hazards – preparation of hazard analysis worksheet

7. Corrective action procedures in processing of fish- flow chart- work sheet preparation

**Course6 B: LIVE STOCK MANAGEMENT-I
(BIOLOGY OF DAIRY ANIMALS)**

Teaching Hours: 60.

Max. Marks: 100

Unit 1: Livestock census; Breeds of Dairy cattle, Buffaloes and Goats. Indigenous, Exotic and Crossbred Cattle breeds

Unit 2: Anatomy of Udder; Development of udder; Lacto genesis and Galactopoises; Letdown of milk.

Unit 3: Artificial insemination; Oestrous cycle; Symptoms of heat in cows and buffaloes. Conception, Pregnancy diagnosis in cattle. Multi ovulation and embryo transfer technique. Cloning.

Unit4: Economic traits of Dairy cattle. Methods of selection of dairy animals.

Unit5: Systems of Dairy cattle breeding. Inbreeding, out breeding, Cross breeding, Grading up. Breeding systems (Cross breeding of cattle and Grading up of buffaloes).

LIVE STOCK MANAGEMENT-I

Practical (Laboratory) Syllabus: (30hrs) (Max.50Marks)

1. Points dairy cow. (Explanation with observation of charts- Model evaluation to be performed by the student in the laboratory)
2. Identification of different breeds of dairy cattle and buffaloes.(Observation of Charts of breeds in the laboratory- at least 3 breeds should be identified by the students in their locality with video, photo)
3. Male and female reproductive systems of cow – Model/ Chart (Student has to draw a labeled diagram of the male and female reproductive systems of cow – acquire skill to identify the parts).
4. Symptoms of heat in cow (Study and Understanding the physiological symptoms during heat).
5. Artificial in semi nation (Flow chart of implements – Procedure- precautions)
6. Pregnancy diagnosis in cattle.
7. Study comparative merits of cows and buffaloes; zebu and cross bred cows (Examination of merits)

Course 7B: LIVE STOCK MANAGEMENT -II (DAIRY PRODUCTION AND MANAGEMENT)

Teaching Hours: 60.

Max. Marks: 100

Unit1: Systems of Housing of Dairy cattle- Loose Housing and Conventional Dairy Barns. Drawing of layouts for dairy cattle dwellings; Criteria for selecting site for establishing Dairy farm buildings; Water requirement of dairy animals.

Unit2: Management of different classes of Dairy animals- Milk producing animals, pregnant animals dry animals, heifers and calves. Management practices for Dairy farm; Identification, Dehorning, Castration, Deworming, Vaccination, Disinfection, and Milking.

Unit 3: (a) Pasteurization of milk: Definition, objects of pasteurization, objections to pasteurization, Principles of heat exchange. Methods of pasteurization: LTLT, HTST and Uperization.

(b)Sterilization of milk. Homogenization: Factors influencing homogenization

Unit 4: Market milk: Toned milk, double toned milk, Reconstituted milk, Standardized milk and full cream milk–Standards and methods of manufacture.

Unit 5: Cream: Types of cream, composition, methods of cream separation, gravity and centrifugal methods, types of cream separators, factors affecting fat losses in skim milk and fat percentage in cream.

Course 7 B: LIVE STOCK MANAGEMENT -II
PRACTICAL SYLLABUS
(DAIRY PRODUCTION AND MANAGEMENT) (30hrs) (Max.50Marks)

1. Dairy Farm layout (In the laboratory student has to sketch a dairy farm with all its components)
2. Identification of cows (students have to identify the breeds of cows from the images/charts – have to identify any two breeds in the vicinity of the college/ their locality).
3. Dehorning of calves : (Method - protocol- precautions)
4. Castration of bulls (Method – Apparatus- Time-importance)
5. Deworming of dairy cattle : (Schedule – method- benefits)
6. Pasteurization of milk (Batch Method- procedure- Observation)
7. Sterilization of milk (In bottle sterilization- procedure – protocol)
8. Cream separation (By gravity method- procedure- hands on experiment)

Course6 C: POULTRY MANAGEMENT- I (POULTRY FARMING)
Teaching Hours: 60. Max. Marks: 100

Unit 1 Indian poultry Industry

- 1.1 Importance of poultry farming and poultry development in India.
- 1.2 Present status and future prospectus of poultry Industry
- 1.3 Classification of poultry based on genetics Utility

Unit -2 Scientific Poultry Keeping

- 2.1 Modern breeds of Chicken
- 2.2 Present day egg production lines- meat production lines
- 2.3 Mini breeds- dwarfism in mini-Leghorns

Unit-3Diversified Poultry

3.1 Ducks and Geese-classification- rearing system-classification-advantages

3.2 Guinea fowls - guinea fowl farming in India-Production-varieties

3.3 Emu-rearing- Economical aspects-commercial products

Unit-4Desi Chickens:

4.1 Indigenous breeds and economical aspects of desi chicken

4.2 Indigenous breeds-Aseel-Chittagong-Kadakhnath-Bursa

4.3 Improved varieties in India – Giriraja-Vanaraja-Girirani-Kalinga brown, Gramapriya, Swarnandhra

Unit -5 Breeds from Central Avian Research Institute – Izatnagar

5.1 CARI Nirbheek - CARI- Shyama-HITCARI (Naked Neck Cross)

5.2 CARI- Priya Layer, CARI- Sonali Layer,

5.3 CARIBRO-VISHAL, CARI-RAINBRO,

5.4 Nandanam chicken-I, Nandanam Chicken-II, Nandanm-Quail

**Course6 C: POULTRY MANAGEMENT- I (POULTRY FARMING)
PRACTICAL SYLLABUS**

V. Practical(Laboratory) Syllabus:(30hrs) (Max.50Marks)

1. Different types of Poultry rearing (Students has to observe and draw the different types of poultry rearing systems)
2. Different types of poultry Housing - Models / Images/charts
3. Different layer breeds images/charts/ Models (Observation of characters)
4. Types of broilers images/charts/ Models (Identification of important Characters)
5. CARI breeds characters –images/charts
6. Nandanam breeds- images/charts (Identification of characters)

Course 7 C: POULTRY MANAGEMENT -II
(POULTRY PRODUCTION AND MANGEMENT)

Teaching Hours: 60.

Max. Marks: 100

Unit-1 HEALTH CARE

1.1 Common poultry diseases: bacterial, viral, fungal, parasitic and nutritional deficiencies.

1.2 Vaccination schedule for commercial layers and broilers: factors that govern vaccination schedule; vaccination principles type, methods, pre and post vaccination care.

1.3 Disinfection: Types of disinfectants; mode of action; recommended procedure; precaution and handling.

Unit-2 ECONOMICS

2.1 Economics of layer and broiler production

2.2 Projects reports in different systems of rearing for layer & broilers.

2.3 Feasibility studies on poultry rearing- in context of small units and their profitability.

2.4 Export/import of poultry and poultry products.

Unit-3 BREEDER FLOCK MANAGEMENT

3.1 Layer and broiler breeder flock management housing & space requirements.

3.2 Different stage of management during life cycle; Light management during growing and laying period, Artificial insemination.

3.3 Feeding: Feed restriction, separate male feeding. Nutrient requirement of layer and broiler breeders of different age groups.

Unit-4 BREEDER HEALTHCARE

4.1 Vaccination of breeder flock; difference between vaccination schedule of broilers and commercial birds.

4.2 Common diseases of breeders (Infectious and metabolic disorders)-prevention.

4.3 Fertility disorder- etiology, diagnosis and corrective measures. Selection and culling of breeder flocks

Unit-5 HATCHERY PRACTICES

5.1 Management principles of incubation.

5.2 Factors affecting fertility and hatchability. Selection, care and incubation of hatching eggs. Fumigation; sanitation and hatchery hygiene.

5.3 Importance of hatchery records, break even analysis of unhatched eggs.

5.4 Computer applications for hatchery management

**Course 7C: POULTRY MANAGEMENT –II- PRACTICAL SYLLLABUS
(POULTRY PRODUCTION AND MANGEMENT) (30hrs) (Max.50Marks)**

1. Poultry Viral diseases – Observation of histopathological slides
2. Poultry Fungal Diseases- Observation of histopathological slides
3. Poultry Bacterial Diseases-Observation of histopathological slides
4. Feasibility study of Poultry establishment: (Preparation of feasibility study report with given parameters)
5. Rearing of Layers – (Preparation of Flow chart
6. Rearing of broiler- Flow chart
7. Hatchery records- Model study/analysis- Report with modified data

**Course6 D: SERI CULTURE -I
(BIOLOGY AND CULTIVATION OF MULBERRY)**

Teaching Hours: 60.

Max. Marks: 100

Unit-1A general introduction to Sericulture

- 1.1 Sericulture map of India: Components of Sericulture.
- 1.2 Textile fibers: Types- natural and synthetic fibers- types of silk produced in India; Importance of mulberry silk:
- 1.3 Sericulture organization in India; role of state departments of Sericulture, Central Silk Board and NGOs in Sericulture development

Unit-2Sericultural Botany.

- 2.1 Taxonomy of mulberry and food plants of silkworms: Study of salient features of the families-Marceau.
- 2.2 Morphology of mulberry: different varieties of mulberry.
- 2.3 Anatomy of mulberry: internal structure of stem, root and leaf; secondary growth in root and stem.

Unit 3 Floral biology of mulberry

3.1 Floral biology of mulberry: Sexual behavior, different types of anthers and ovule in mulberry; micro- and megaspore genesis.

3.2 Development of male and female gametophytes; pollination, fertilization

3.3 Development of endosperm, embryo and seed; polyembryony and parthenocarpy in mulberry.

Unit-4 Silkworm Biology.

4.1 Characteristic features of the order Lepidoptera; detailed study of the families- Saturnidae and Bombycid. Classification of sericigenous insects.

4.2 Classification of silkworms based on moultnism, voltinism and geographical distribution; popular silkworm breeds and hybrids of Karnataka; their economic traits

Unit-5 Morphology and anatomy of reproductive systems of silk moth.

5.1 Life cycle of *Bombyx Mori*; morphology of egg, larva, pupa and adult

Course: 6 D: SERI CULTURE -I **PRACTICAL SYLLABUS** (30hrs) (Max.50Marks)

1. Sericulture map of India and Karnataka.
2. Preparation of histograms and pie charts on:
3. Production of textile fibers in India.
4. Pie chart on mulberry and non-mulberry silk production in India.
5. Life cycle of *Bombyx mori*- Morphology of egg, larva, pupa and adult of *Bombyx mori*.
6. Sex separation in larva, pupa and adult of the silkworm *Bombyx mori*.
7. Dissection and display of: Digestive system of larva. Silk glands.

Course: 7 D: **SERICULTURE -II**
(BIOLOGY AND REARING OF SILKWORM)

Teaching Hours: 60.

Max. Marks: 100

Unit-1

1.1 Rearing house: Location, orientation, plan and utilities; model rearing house; low-cost rearing house.

1.2 Rearing appliances-shelf and shoot rearing; requirements of rearing appliances (per unit rearing of 100dfis).

Unit-2

2.1 Disinfection of rearing house and rearing appliances; (disinfectants formalin, bleaching powder, chlorine dioxide, slaked lime and iodine compounds);

2.2 Rearing and personal hygiene.

Unit-3

3.1 Incubation- definition, requirement of environmental conditions, incubation devices; identification of stages of development; black boxing and its importance.

3.2 Chawki rearing: Preparation; brushing and its methods; types of chawki rearing - traditional and improved method; optimum environmental conditions; methods and frequency of feeding; methods of bed cleaning; spacing; moulting and care during moult.

Unit -4

4.1 Late age silkworm rearing: Methods; optimum environmental conditions; feeding quantity and frequency; methods of bed cleaning; spacing; moulting and care during moult.

4.2. Identification of spinning larva; spinning; mounting and mounting density; types of mountages, their advantages and disadvantages; environmental requirements during spinning.

Unit -5

5.1 Harvesting: Time of harvesting; sorting, storage/ preservation

5.2 Packaging and transport of cocoons; leaf-cocoon ratio; Maintenance of rearing records.

Course 7 -D: SERICULTURE –II-PRACTICAL SYLLABUS
(BIOLOGY AND REARING OF SILKWORM) (30hrs) (Max.50Marks)

1. Morphology and structure of silkworm egg, fertilization, Diapause development
2. Rearing house: Location, orientation, plan and utilities; model rearing house; low-cost rearing house.
3. Disinfection of rearing house and rearing appliances;
4. Incubation of silkworm eggs- Methods; black boxing; maintenance of temperature and humidity; Brushing: Methods; chawki rearing; use of paraffin paper and blue polythene sheet.
5. Bed cleaning: use of bed cleaning net and disposal of bed refuses and silkworm litter.
6. Moulting: Identification of moulting larva, care during moulting; mounting and mounting density; harvesting of cocoons; assessment of cocoons; types of mountages;
7. Study the mulberry leaf by graph paper method : (for calculating the leaf area)