Government College for Women(A), Guntur.

COURSE INFORMATION BOOKLET

2023-2024

DEPARTMENT OF ZOOLOGY

CONTENTS

Vision and Mission of the Department

VISION

1. The department aims at holistic growth of students with a bunch of Employable skills and Ethical values.

MISSION

1. By imparting advanced knowledge and skills in the field of Animal Sciences.
2. By sensitizing students on conservation and protection of Biodiversity.
3. By encouraging the students to participate in Animal Sciences related co-curricular activities.
4. By providing space for the students to learn through online platforms to update their knowledge.
5. By training the students in allied sectors of Animal Science such Poultry, Aquaculture and Dairy related industries in the course curriculum.
6. By igniting the minds towards critical thinking and research aptitude. accountability, and social responsibility in academic and professional pursuits.

Zoology Programme Aim:

The aim of the B.Sc. Zoology is to impart latest knowledge to the students that makes them to ready for job by the completion of the programme.

Objectives for a B.Sc. Zoology programme:

- Provide clear understanding of key concepts of physiology, cell biology, genetics and evolution.
- Understand the importance of ecological balance, wild life conservation, dynamics of ecosystem and populations.
- Incorporation internships in academic curriculum to integrate the theory and practical skills simultaneously.

Program Specific outcomes of B.Sc. Zoology

PSO	After completion of the B.Sc. Zoology programme, students will be able to
PSO 1	Develop a solid foundation in various branches of Zoology including Systematics, Taxonomy, Physiology, Ecology, Genetics, Cell Biology, Embryology, Evolutionary Biology and Molecular Biology.
PSO 2	Acquire ability to conduct field studies and surveys and understand the principles of Biodiversity, Conservation and role of Zoologists in preserving the ecosystems and Wild Life.
PSO 3	Foster an attitude of continuous learning and updating with the latest developments in Zoology and related fields, prepare for higher studies, careers in research, teaching and entrepreneurial skills related to Zoology.

List of Programmes offered by the Department

S. No	Title of the programme
1	B. Sc. Zoology Major
2.	B. Sc. Aquaculture Major
2	B.Sc. Botany, Zoology, Chemistry
3	B.Sc. Microbiology, Zoology, Chemistry
4	B. Sc. Biotechnology, Zoology, Chemistry
5	B.Sc. Food Science, Zoology, Biochemistry
6	B. Sc. Aquaculture Technology, Zoology, Chemistry

B.Sc Zoology course structure (Three major system)

Semester	Paper	Title of the course	Course code
I	1	Animal Diversity- Biology of Non- Chordates	ZOO 402-1
II	2	Animal Diversity- Biology of Chordates	ZOO 402-2
Community Service Project			
III	3	Cell Biology, Genetics, Molecular Biology and Evolution	ZOO 402-3
IV	4	Animal Physiology, Cellular Metabolism and Embryology	ZOO 402-4
	5	Animal Biotechnology and Immunology	ZOO 402-5
Short term internship			
V	6A	Sustainable Aquaculture Management	ZOO 402-6A
	7A	Post-Harvest Technology of Fishes and Fisheries	ZOO 402-7A
VI		Semester end Internship	

B.Sc., Zoology course structure: (Single major system)

Year	Semester	Course number	Title of the course	Course code
I	I	1	Introduction to Classical Biology	1LS-CM-01
		2	Introduction to Applied Biology	1LS-CM-02
	II	3	Animal Diversity- Biology of Non-Chordates	2ZOO-03
		4	Cell and Molecular Biology	2ZOO-04
	Community Service project			
II	III	5	Animal Diversity-II Biology of Chordates	
		6	Principles of Genetics	
		7	Animal Biotechnology	
		8	Evolution and Zoogeography	

	IV	9	Embryology	
		10	Animal Physiology: Life Sustaining Systems	
		11	Immunology	
		12	Poultry Management-I (Poultry Farming)	
		13	Poultry Management-II (Poultry Production and Management)	
III	V	14	Sustainable Aquaculture Management	
		15	Post-Harvest Technology of Fish and Fisheries	
	VI		Semester Internship/ Apprenticeship	

List of SDCs offered by the Department: Poultry Farming

Course wise syllabus with outcomes

Single Major System

SEMESTER-I PAPER – I

Course title: INTRODUCTION TO CLASSICAL BIOLOGY

Course code: 1LS-CM-01

Course Outcomes

1. Learn the principles of classification and preservation of biodiversity
2. Understand the plant anatomical, physiological and reproductive processes.
3. Knowledge on animal classification, physiology, embryonic development and their economic importance.
4. Outline the cell components, cell processes like cell division, heredity and molecular processes.
5. Comprehend the chemical principles in shaping and driving the macromolecules and life processes.

SYLLABUS

Unit 1: Introduction to systematics, taxonomy and ecology.

1.1. Systematics – Definition and concept, Taxonomy – Definition and hierarchy. 1.2. Nomenclature – ICBN and ICZN, Binomial and trinomial nomenclature. 1.3. Ecology – Concept of ecosystem, Biodiversity and conservation. 1.4. Pollution and climate change.

Unit 2: Essentials of Botany.

2.1. The classification of plant kingdom. 2.2. Plant physiological processes (Photosynthesis, Respiration, Transpiration, phytohormones)

2.3. Structure of flower – Micro and macro sporogenesis, pollination, fertilization and structure of mono and dicot embryos. 2.4 Mushroom cultivation, floriculture and landscaping.

Unit 3: Essentials of Zoology

3.1. The classification of Kingdom Animalia and Chordata. 3.2 Animal Physiology – Basics of Organ Systems & their functions, Hormones and Disorders 3.3 Developmental Biology – Basic process of development (Gametogenesis, Fertilization, Cleavage and Organogenesis) 3.4 Economic Zoology – Sericulture, Apiculture, Aquaculture

Unit 4: Cell biology, Genetics and Evolution 4.1. Cell theory, Ultrastructure of prokaryotic and eukaryotic cell, cell cycle. 4.2. Chromosomes and heredity – Structure of chromosomes, concept of gene. 4.3. Central Dogma of Molecular Biology. 4.4. Origin of life

Unit 5:: Essentials of chemistry 5.1. Definition and scope of chemistry, applications of chemistry in daily life. 5.2. Branches of chemistry 5.3. Chemical bonds – ionic, covalent, Non covalent – Vander Waals, hydrophobic, hydrogen bonds. 5.4. Green chemistry

Prescribed Text book:

1. Sharma O.P., 1993. Plant taxonomy. 2 nd Edition. McGraw Hill publishers.

2. Pandey B.P., 2001. The textbook of botany Angiosperms. 4 th edition. S. Chand publishers, New Delhi, India.

Reference Books:

1. Jordan E.L., Verma P.S., 2018. Chordate Zoology. S. Chand publishers, New Delhi, India.

2. Rastogi, S.C., 2019. Essentials of animal physiology.

4 th Edition. New Age International Publishers.

3. Verma P.S., Agarwal V.K., 2006. Cell biology, genetics, Molecular Biology, Evolution and Ecology. S. Chand publishers, New Delhi, India.

SEMESTER – PAPER – II

Course title: INTRODUCTION TO APPLIED BIOLOGY

Course code: 1LS-CM-02

Course Outcomes

1. Learn the history, ultrastructure, diversity and importance of microorganisms.
2. Understand the structure and functions of macromolecules.
3. Knowledge on biotechnology principles and its applications in food and medicine.
4. Outline the techniques, tools and their uses in diagnosis and therapy.
5. Demonstrate the bioinformatics and statistical tools in comprehending the complex biological data.

SYLLABUS

Unit 1: Essentials of Microbiology and Immunology

1.1. History and Major Milestones of Microbiology; Contributions of Edward Jenner, Louis Pasteur, Robert Koch and Joseph Lister.

1.2. Groups of Microorganisms – Structure and characteristics of Bacteria, Fungi, Archaea and Virus.

1.3. Applications of microorganisms in – Food, Agriculture, Environment, and Industry.

1.4. Immune system – Immunity, types of immunity, cells and organs of immune system.

Unit 2: Essentials of Biochemistry

2.1. Biomolecules I – Carbohydrates, Lipids.

2.2. Biomolecules II – Amino acids & Proteins.

2.3. Biomolecules III – Nucleic acids -DNA and RNA.

2.4. Basics of Metabolism – Anabolism and catabolism.

nit 3: Essentials of Biotechnology

3.1. History, scope, and significance of biotechnology. Applications of biotechnology in Plant,Animal, Industrial and Pharmaceutical sciences.

3.2. Environmental Biotechnology – Bioremediation and Biofuels, Biofertilizers and Biopesticides.

3.3. Genetic engineering – Gene manipulation using restriction enzymes and cloning vectors;Physical, chemical, and biological methods of gene transfer.

3.4. Transgenic plants – Stress tolerant plants (biotic stress – BT cotton, abiotic stress – salttolerance). Transgenic animals – Animal and disease models.

Unit 4: Analytical Tools and techniques in biology – Applications

4.1. Applications in forensics – PCR and DNA fingerprinting

4.2. Immunological techniques – Immunoblotting and ELISA.

4.3. Monoclonal antibodies – Applications in diagnosis and therapy.

4.4. Eugenics and Gene therapy

Unit 5: Biostatistics and Bioinformatics

5.1. Data collection and sampling. Measures of central tendency – Mean, Median, Mode.

5.2. Measures of dispersion – range, standard deviation and variance. Probability and tests of significance.

5.3. Introduction, Genomics, Proteomics, types of Biological data, biological databases- NCBI, EBI, Gen Bank; Protein 3D structures, Sequence alignment

5.4. Accessing Nucleic Acid and Protein databases, NCBI Genome Workbench

Prescribed Text book:

1. Micale, J. Pelczar Jr., E.C.S. Chan., Noel R. Kraig., 2002. Pelczar Microbiology. 5th Edition. McGraw Education, New York, USA.
2. Sathyanarayana U., Chakrapani, U., 2013. Biochemistry. 4th Edition. Elsevier publishers.

Reference Books:

1. R.C. Dubey, 2014. Advanced Biotechnology. S. Chand Publishers, New Delhi, India.
2. U. Sathyanarayana, 2005. Biotechnology. 1st Edition. Books and Allied Publishers pvt. ltd., Kolkata.

SEMESTER – II PAPER III

Course title: **ANIMAL DIVERSITY-I BIOLOGY OF NON-CHORDATES**

Course code: **2ZOO-3**

Course Outcomes:

CO. No	Upon the successful completion of the course, students will be able to	Bloom's taxonomy cognitive domain
CO - 1	Outline the classification of animal kingdom based on levels of organization, symmetry and coelom.	L1
CO - 2	Analyze and evaluate the phylogenetic relation among invertebrate phyla by observing general characters of phyla	L4
CO - 3	Appraise the economic importance of non-chordates by studying vermicomposting, harmful insects, pathogens and pearl formation	L4

SYLLABUS

UNIT-I

1.1 Whittaker's five kingdom concept and classification of Animal Kingdom.
1.2 Protozoa General Characters and classification up to classes with suitable examples.
1.3 Protozoa Locomotion & nutrition
1.4 Protozoa reproduction- Asexual (binary, multiple fission and sporulation) and Sexual (Conjugation)
1.5 General account on protozoan parasites (Entamoeba, Plasmodium, Cryptosporidium and Giardia)

UNIT – II

2.1 Porifera General characters and classification up to classes with suitable examples
2.2 Canal system in sponges- Ascon, Sycon, Leucon
2.3 Coelenterata: General characters and classification up to classes with suitable examples
2.4 Polymorphism in coelenterates
2.5 Corals and coral reefs

UNIT – III

3.1 Platyhelminthes General characters and classification up to classes with suitable examples
3.2 Parasitic Adaptations in helminthes
3.3 Nemathelminthes General characters and classification up to classes with suitable examples

3.4 Life cycle and pathogenicity of *Ascaris lumbricoides*

3.5 *General account on Taenia, Schistosoma, Ancylostoma and Trichuris*

UNIT – IV

4.1 Annelida: General characters and classification up to classes with suitable examples

4.2 Vermiculture - Scope, significance, earthworm species, processing, Vermicompost, economic importance of vermicompost

4.3 Arthropoda: General characters and classification up to classes with suitable examples

4.4 .Harmful insects(Disease transmitting insects – Mosquito ,Housefly, Tse tse fly and Bot fly and Venomous insects-Honey bee, wasp, Ants , Blister beetles)

4.5 *Peripatus* - Structure and affinities

UNIT – V

5.1 Mollusca General characters and classification up to classes with suitable examples

5.2 Pearl formation in Pelecypoda

5.3 Echinodermata General characters and classification up to classes with suitable examples Water vascular system in star fish

5.4 Hemichordata General characters and classification up to classes with suitable examples

***Balanoglossus* - Structure and affinities**

Prescribed Text book:

1. Kotpal, R.L. 1988 - 1992 Protozoa, Porifera, Coelenterata, Helminthes, Arthropoda, Mollusca, Echinodermata. Rastogi Publications, Meerut.

Reference Books:

- E.L. Jordan and P.S. Verma „*Invertebrate Zoology'* S. Chand and Company.

SEMESTER-II, PAPER – IV

Course Title: **CELL AND MOLECULAR BIOLOGY**
Course Code: **2ZOO-04**

Course Learning Outcomes:

CO. No	Upon the successful completion of the course, students will be able to	Bloom's taxonomy cognitive domain
CO - 1	Understand the basic structural and functional unit of the living organisms and could explain the mechanism and regulation of cell cycle and bioenergetics of the cell	L2
CO - 2	Illustrate fine structure and function of cell organelles of eukaryotic cell	L4
CO - 3	Correlate the properties of biomolecules to the life perpetuating mechanisms such as replication, transcription and translation	L4

SYLLABUS

UNIT – I Cell Biology-I

1.1 Definition, history, prokaryotic and eukaryotic cells, virus, viroids, mycoplasma
1.2 Electron microscopic structure of animal cell.
1.3 Plasma membrane –Bilemellar, Micellar, Unit membrane and Fluid mosaic models
1.4 Transport functions of plasma membrane-Diffussion, Osmosis, Passive- facilitated Active transport. Aquaporins and Transport proteins

UNIT – II Cell Biology-II

2.1 Structure and functions of Golgi complex & Endoplasmic Reticulum
2.2 Structure and functions of Lysosomes & Ribosomes
2.3 Structure and functions of Mitochondria & Centriole
2.4 Structure and functions of Nucleus & Chromosomes

UNIT – III Cell Biology-III

- Cell Division- mitosis, meiosis
- Cell cycle – stages- check points- regulation
- Abnormal cell growth- cancer- apoptosis
- Bio energetics- Glycolysis-Krebs cycle-ETS- β Oxidation of fatty acids.

UNIT IV: Molecular Biology-I

4.1 Central Dogma of Molecular Biology

4.2 Basic concepts of - DNA replication – Overview (Semi-conservative mechanism, Semi-discontinuous mode, Origin & Propagation of replication fork)

4.3 Transcription in prokaryotes and eukaryotes – Initiation, Elongation and Termination, Post-transcriptional modifications (basics)

4.4 Translation in prokaryotes and eukaryotes – Initiation, Elongation and Termination

UNIT IV: Molecular Biology-II

5.1 Gene Expression in prokaryotes (Lac Operon, Tryptophan operon); Gene Expression in eukaryotes

5.2 Biomolecules- Carbohydrates (Glucose- structure-properties- biological importance only)

5.3 Biomolecules- Amino acid- (structure- properties- biological importance only) Protein structure- primary, secondary, tertiary and quaternary structures.

5.4 Biomolecules- Lipids (Fatty acids,Triacylglycerol, Phospholipids. cholesterol- structure - properties- biological importance only)

Prescribed books:

- Varma & Aggarwal, Cell Biology

Reference Books:

1. C.B. Pawar, Cell Biology
2. Instant Notes in Molecular Biology by Bios scientific publishers and Viva BooksPrivate Limited
3. James D. Watson, Nancy H. Hopkins „Molecular Biology of the Gen

THREE MAJOR SYSTEM

SEMESTER – III, PAPER - III

Course Title: CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION

Course Code: Z00402-3

Course Learning Outcomes:

CO. No	Upon the successful completion of the course, students will be able to	Bloom's taxonomy cognitive domain
CO - 1	To understand the origin, structure and functions of cell organelles and the molecular mechanisms involved in cellular homeostasis	L2
CO - 2	To know, understand and predict the inheritance and variations of characters by various gene interactions	L2, L6
CO - 3	To reveal the molecular basis of evolution and to know evolutionary forces with evidences	L2

SYLLABUS

Unit – I Cell Biology

1.1 Definition, history, prokaryotic and eukaryotic cells, virus, mycoplasma
1.2 Electron microscopic structure of animal cell.
1.3 Plasma membrane –Models and transport functions of plasma membrane.
1.4Structure and functions of Golgi complex, Endoplasmic Reticulum and Lysosomes
1.5 Structure and functions of Ribosomes, Mitochondria, Nucleus, Chromosomes
(Note: 1. General pattern of study of each cell organelle – Discovery, Occurrence, Number, Origin, Structure and Functions with suitable diagrams
2. Need not study cellular respiration under mitochondrial functions)

Unit – II Genetics - I

2. 1 Mendel's work on transmission of traits
2. 2 Gene Interaction – Incomplete Dominance, Codominance, Lethal Genes
2. 3 Polygenes (General Characteristics & examples); Multiple Alleles (General Characteristics and Blood group inheritance
2. 4 Sex determination (Chromosomal, Genic Balance, Hormonal, Environmental and Haplo-diploidy types of sex determination)

2. 5 Sex linked inheritance (X-linked, Y-linked & XY-linked inheritance), Sex-Limited and Sex-Influences genes

Unit – III Genetics - II

3.1 Mutations & Mutagenesis

3.2 Chromosomal Disorders - Autosomal and Allosomal (Turners, Klinefelters, Downs, Edwards, Patau and Cri-du-Chat syndromes).

3.3 Human Genetics – Karyotyping, Pedigree Analysis (basics)

3.4 Basics on Genomics and Proteomics

UNIT IV: Molecular Biology

4.1 Structure of DNA & Types of DNA

4.2 Central Dogma of Molecular Biology -Basic concepts of -

a. DNA replication – Overview (Semi-conservative mechanism, Semi-discontinuous mode, Origin & Propagation of replication fork)

b. Transcription in prokaryotes – Initiation, Elongation and Termination, Post-transcriptional modifications (basics)

c. Translation – Initiation, Elongation and Termination

4.3 Gene Expression in prokaryotes (Lac Operon & Tryptophan operon); Gene Expression in eukaryotes

Unit – V Evolution

5.1 Origin of life - (Special Creation theory, Cosmozoic theory, Panspermia , Abiogenesis, Chemical Evolution- Urey & Miller experiment, Theory of Biogenesis)

5.2 Theories of Evolution: Lamarckism, Darwinism, Germ Plasm Theory, Mutation Theory

5.3Neo-Darwinism: Modern Synthetic Theory of Evolution, Hardy-Weinberg Equilibrium

5.4Forces of Evolution: Isolating mechanisms, Genetic Drift, Types of Natural Selection, Speciation (Allopatric, Sympatric, Parapatric & Peripatric speciation)

Reference books

- Eckert H. Animal Physiology: Mechanisms and Adaptation. W.H. Freeman & Company.
- Floray E. An Introduction to General and Comparative Animal Physiology. W.B.Saunders 'Chordate Embryology' by S. Chand
- 'Developmental Biology - Scott. F. Gilbert.
- 'Developmental Genetics – G.S. Miglani.

SEMESTER – IV

PAPER – IV

Course Title: **ANIMAL PHYSIOLOGY, CELLULAR METABOLISM AND EMBRYOLOGY**

Course Code: **ZOO402-4**

Course Outcomes:

CO. No	Upon the successful completion of the course, students will be able to	Bloom's taxonomy cognitive domain
CO - 1	To achieve a thorough understanding of various aspects of physiological systems and their regulations.	L2
CO - 2	To understand and analyse structure, classification and functional aspects of biomolecles.	L2, L4
CO-3	To illustrate the process of gametogenesis, fertilization, embryonic development and categories the types of eggs and cleavages.	L3&L4

SYLLABUS

UNIT I - Animal Physiology - I

1.1 Process of digestion, absorption and assimilation

1.2 Respiration - Pulmonary ventilation, transport of oxygen and CO2 (Note: Need not study cellular respiration here)

1.3 Circulation - Structure and functioning of heart, Cardiac cycle, ECG- Basics of electrophysiology of heart

1.4 Excretion - Structure and functions of kidney, Hormonal regulation of urine formation, counter current Mechanism

UN IT II - Animal Physiology - II

2.1Nerve impulse transmission - Resting membrane potential, origin and propagation of action potentials along myelinated and non-myelinated nerve fibres

2.2Muscle contraction - Ultra structure of muscle, molecular and chemical basis of muscle contraction, Cori cycle

2.3 Endocrine glands - Structure, functions of hormones of pituitary, thyroid, parathyroid, adrenal glands and pancreas

2.4 Hormonal control of reproduction in a mammal

UNIT III - Cellular Metabolism – I (Biomolecules)

3.1 Carbohydrates - Classification of carbohydrates. Structure of glucose

3.2 Proteins - Classification of proteins. General properties of amino acids

3.3 Lipids - Classification of lipids & Biological significance

3.4 Enzymes: Classification and Mechanism of Action

UNIT IV - Cellular Metabolism – II

4.1Carbohydrate Metabolism - Glycolysis, Krebs cycle, Electron Transport Chain, Glycogen metabolism, Gluconeogenesis

4.2 Lipid Metabolism – β-oxidation of palmitic acid

4.3 Protein metabolism - Transamination, Deamination and Urea Cycle

UNIT – V Embryology

5.1 Gametogenesis

5.2 Fertilization

5.3 Types of eggs

5.4 Types of cleavages

5. 5 Development of Frog upto formation of primary germ layers , Embryonic Induction (Organiser concept)

SEMESTER-IVPAPER – V

Course Title: **IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY**

Course Code: **ZOO402- 5**

Course Outcomes:

CO. No	Upon the successful completion of the course, students will be able to	Bloom's taxonomy cognitive domain
CO - 1	To recall and describe fundamental concepts in immunology	L1, L2
CO - 2	To identify and apply knowledge in cellular and molecular aspects of immune system	L1, L3
CO - 3	To create and utilize various techniques for analysis of biomolecules and also analyze the techniques for manipulating reproduction in animals **(L5, L4)**	L4, L5

SYLLABUS

Unit – I Immunology – I (Overview of Immune system)

1.1 Introduction to basic concepts in Immunology

1.2 Innate and adaptive immunity, Vaccines and Immunization programme

1.3 Cells of immune system

1.4 Organs of immune system

Additional inputs: Immunodeficiency

Unit – II Immunology – II (Antigens, Antibodies, MHC and Hypersensitivity)

2.1 Antigens: Basic properties of antigens, B and T cell epitopes, haptens and adjuvants; Factors influencing immunogenicity

2.2 Antibodies: Structure of antibody, Classes and functions of antibodies

2.3 Structure and functions of major histocompatibility complexes

2.4 Exogenous and Endogenous pathways of antigen presentation and processing

2.5 Hypersensitivity – Classification and Types

Additional inputs: Types of antigens

Unit – III Techniques

3.1 Animal Cell, Tissue and Organ culture media: Natural and Synthetic media,

3.2 Cell cultures: Establishment of cell culture (primary culture, secondary culture, types of cell lines; Protocols for Primary Cell Culture); Established Cell lines (common examples such as MRC, HeLa, CHO, BHK, Vero); Organ culture; Cryopreservation of cultures

3.3 Stem cells: Types of stem cells and applications

3.4 Hybridoma Technology: Production & applications of Monoclonal antibodies (mAb)

Unit – IV Applications of Animal Biotechnology

4.1 Genetic Engineering: Basic concept, Vectors, Restriction Endonucleases, DNA ligase Recombinant DNA technology

4.2 Gene delivery: Microinjection, electroporation, biolistic method (gene gun), liposome and viral-mediated gene delivery
4.3. PCR:Basics of PCR.
4.4. DNA Sequencing: Sanger's method of DNA sequencing- traditional and automated sequencing
4.5. Hybridization techniques: Southern, Northern and Western blotting

Unit - V

5.1 Manipulation of reproduction in animals: Artificial Insemination, In vitro fertilization, super ovulation, Embryo transfer, Embryo cloning
5.2. Transgenic Animals: Strategies of Gene transfer; Transgenic - sheep, - fish; applications
5.3 DNA fingerprinting: Procedure and applications
5.4 Applications in Industry: Fermentation: Different types of Fermentation and Downstream processing
5.5. Applications in Agriculture: Monoculture in fishes, polyploidy in fishes

Additional Input: Gene Therapy

REFERENCE BOOKS

1. Immunology by Ivan M. Riott
2. Immunology by Kubey
3. Sreekrishna V. 2005. Biotechnology –I,
4.Cell Biology and Genetics. New Age International Publ.New Delhi, India.

SEMESTER V

Paper-6A

Course Title: **SUSTAINABLE AQUACULTURE MANAGEMENT**

Course Code: **Z00402-6A**

Course Outcomes:

CO. No	Upon the successful completion of the course, students will be able to	Bloom's taxonomy cognitive domain
CO - 1	Students identify various types of aquaculture systems	L1
CO - 2	Determine the most profitable culture species among all the species he/she studies	L3
CO - 3	Analyze the values of various water quality variables to predict the diseases	L4

SYLLABUS

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 andshrimp.

1.4 Design and construction of fish and shrimp farms

Additional inputs: Types of hatcheries

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, CO_2 and nutrients)

Unit: 3

3.1. Induced breeding in fishes

3.2. Culture of Indian major carps:Pre-stocking management (De-watering,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

Additional inputs: Probiotics in health management

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

Additional inputs: Protozoan diseases of Fin & Shell fish

I. References:

1. Pillay TVR & M.A.Dill, 1979. Advances in Aquaculture. Fishing News Books Ltd., London
2. Stickney RR 1979. Principles of Warm Water Aquaculture. John Wiley & Sons Inc.1981
3. Boyd CE 1982. Water Quality Management for Pond Fish Culture. Elsivier Scientific Publishing Company.
4. Bose AN et.al. 1991. Costal Aquaculture Engineering. Oxford & IBH Publishing CompanyPvt. Ltd.

SEMESTER V

Paper 7 A

Course Title: POST HARVEST TECHNOLOGY OF FISH AND FISHERIES

Course Code: Z00402- 7A

Course outcomes

CO. No	Upon the successful completion of the course, students will be able to	Bloom's taxonomy cognitive domain
CO - 1	Explain the concept of rigor mortis and prevention of spoilage of fish and compare and contrast various fish preservation methods employed in aquaculture.	L2& L4
CO - 2	Examine various fish products and by products and assess the impact of sanitation on product quality and safety.	L3, L6
CO - 3	Develop a seafood safety plan using Sea food quality assurance and various systems in seafood safety and understand the significance of National and International quality standards in seafood safety.	L2, L5

SYLLABUS

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

3.1Fish 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, Ising glass, chitosan, pearl essence, shark fins, fish Leather and fish maws.

Additional input: Surimi

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.

LSC/SDC/SEC offered by the Department

GOVT. COLLEGE FOR WOMEN (A), GUNTUR
DEPARTMENT OF ZOOLOGY
II B.Sc. SKILL DEVELOPMENT COURSES
ZOOLOGY STREAM SYLLABUS OF POULTRY FARMING

Course Learning Outcomes

1. Understand the field level structure and functioning of insurance sector and it's role in protecting the risks
2. Comprehend pertaining skills and their application for promoting insurance coverage
3. Prepare better for the Insurance Agent examination conducted by IRDA
4. Plan 'promoting insurance coverage practice' as one of the career options.

Unit- I Introduction to Poultry Farming

1.1 General introduction to poultry farming -Definition of Poultry; Past and present scenario of poultry industry in India.

1.2 Principles of poultry housing. Poultry houses. Systems of poultry farming.

1.3 Management of chicks, growers and layers. Management of Broilers.

1.4 Preparation of project report for banking and insurance

Unit - II Feed and Livestock Health Management

2.1 Poultry feed management – Principles of feeding, Nutrient requirements for different stages of layers and broilers. Feed formulation and Methods of feeding.

2.2 Poultry diseases – viral, bacterial, fungal and parasitic (two each); symptoms, control and management; Vaccination programme.

Unit-III Harvesting of Eggs and Sanitation

3.1 Selection, care and handling of hatching eggs. Egg testing. Methods of hatching.

3.2 Brooding and rearing. Sexing of chicks.

3.3 Farm and Water Hygiene, Recycling of poultry waste.

Reference books:

1. Sreenivasaiah., P. V., 2015. Textbook of Poultry Science. 1st Edition. Write & Print Publications, New Delhi

2. Jull A. Morley, 2007. Successful Poultry Management. 2nd Edition. Biotech Books, New Delhi"

3. Hurd M. Louis, 2003. Modern Poultry Farming. 1st Edition. International Book Distributing Company, Lucknow."

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