

SRI VENKATESWARA UNIVERSITY::TIRUPATI

S.V.U.COLLEGE OF SCIENCES

CHOICE BASED CREDIT SYSTEM

(for regular students those who study in S.V.U.College (Campus), Tirupati)

(from the batch of students admitted during the academic year 2015-16)

M.Sc. ZOOLOGY

SCHEME OF INSTRUCTION AND EXAMINATION

Semester	Code	Title of the Course	Core/ Elective	No. of Credits	Internal Assessment	Semester End Exam	Total Marks
I		Theory:					
	Zoo-101	Invertebrata and Chordata	Core	4	30	70	100
	Zoo-102	Molecular Biology	Core	4	30	70	100
	Zoo-103	Introduction to Computer Applications & Bio-informatics	Core	4	30	70	100
	Zoo-104	Tools & Techniques and Biostatistics	Core	4	30	70	100
		Practicals					
	Zoo-105	Practical-I: 101 & 102	Core	4	---	100	100
Zoo-106	Practical-II: 103 & 104	Core	4	---	100	100	
II		Theory:					
	Zoo-201	Physiological Chemistry	Core	4	30	70	100
	Zoo-202	Cell Biology and Immunology	Core	4	30	70	100
	Zoo-203	Genetics and Genetic Engineering	Core	4	30	70	100
	Zoo-204	Enzymology	Core	4	30	70	100
		Practicals:					
	Zoo-205	Practical-III:201 & 202	Core	4	--	100	100
Zoo-206	Practical-IV:203 & 204	Core	4	--	100	100	
207	Human Values and Professional Ethics – I	Core	4	30	70	100	
III		Theory:					
	Zoo-301	Comparative Animal Physiology	Core	4	30	70	100
	Zoo-302	Neurobiology	Core	4	30	70	100
	Zoo-303	Environmental Biology	Core	4	30	70	100
	Zoo 304	Toxicology	Core		30	70	100
		Practicals:					
	Zoo-305	Practical-V: 301 & 302	Core	4	--	100	100
Zoo-306	Practical-VI: 303 & 304	Core	4	---	100	100	
IV	Zoo-401	Evolution and Animal Behavior	Core	4	30	70	100
	Zoo-402	Biodiversity and Wild Life Conservation	Core	4	30	70	100
	Zoo-403	Any one of the following 403-A-Developmental Biology 403-B-Endocrinology	IE	4	30	70	100
	Zoo-404	Any one of the following 404-A- Animal Biotechnology and Microbiology 404-B-Biomedical Sciences	IE	4	30	70	100
		Practicals					
	Zoo-405	Practical-VII: 401 & 402	Core	4	--		100
	Zoo-406	Practical -VIII: 403 A or B & 404 A or B	IE	4	--		100
	Zoo-407	Pathobiology	EE	4	--	100	100
	Zoo-408	Sericulture	SSC	4	--	100	100
Zoo-409	Human Values and Professional Ethics – II	Core	4	30	70	100	
Total Marks excluding SSC :		Total Number of Credits : 96				2400	
IE : Internal Elective		EE – External Elective		SSC: Self Study Course			

Number of Hours allotted

a) **Theory : 4 hours/ week**

b) **Practicals : 9 hours/ week**

c) **IA: Internal Assessment for Non-CBCS Students 20 80 100**

SRI VENKATESWARA UNIVERSITY::TIRUPATI
SVU COLLEGE OF SCIENCES
DEPARTMENT OF ZOOLOGY
CHOICE BASED CREDIT SYSTEM

SEMESTER -I
(effective from the batch of students admitted during the academic year 2015-16)
REVISED SYLLABUS

ZOO-101: INVERTEBRATA & CHORDATA

UNIT-I : Invertebrata

- 1.1 Evolutionary time scale, Eras, Periods & Epoch - major events.
- 1.2 Species concept, International code of Zoological nomenclature, Taxonomical procedures, New Trends in taxonomy.
- 1.3 Patterns of feeding and digestion in lower metazoans: Holozoic nutrition , Pinocytosis, Saprozoic Nutrition, Myxotrophic nutrition, Nutrition of parasites.
- 1.4 Feeding in Polychaeta, Mollusca, Echinodermata.

UNIT-II : Invertebrata

- 2.1 Acoelomata, Pseudocoelomata, Coelomata, Proterostomia and Deuterostomia.
- 2.2 Structure of Gill, lungs, trachea and Mechanism of Respiration. Circulatory system in Annelids, Arthropods & Molluscs.
- 2.3 Advanced nervous system- Annelida, Arthropoda and Mollusca.
- 2.4 **Larval forms of Crustaceans:** Larval forms: Nauplius, Metanauplius, Protozoa, Zoea, Cypris, Mysis, Megalopa, Phyllosoma, Alima, Significance of larval forms;
Larval forms of Echinodermata: Asteroidea Bipinnaria Larva, Ophiuroidea, Echinoidea, Holothuroidea, Crinoidea Doliolaria Larva, Significance of Echinoderm larval forms.

UNIT – III : Anatomy

- 3.1 Vertebrate integument and derivatives: - Skin structure and functions - glands, scales, horns, claws, nails, hoofs, feathers and hair.
- 3.2 Comparative anatomy of heart: - Types - structure- blood circulation-aortic arches and portal system.
- 3.3 Comparative anatomy of reproductive system: - Organs of male reproductive system – organs of female reproductive system –functions.
- 3.4 Comparative account of excretory system.

UNIT – IV : Organs

- 4.1 Comparative anatomy of respiratory organs: - Gills, trachea and lungs – types-structure-mechanism of respiration.
- 4.2 Comparative anatomy of brain and spinal cord: - structure, composition and functions
- 4.3 Organs of vision: structure of eye in different phyla - mechanism of vision, Photoreceptors- fishes, Amphibians, Reptiles, Birds and Mammals.
- 4.4 Organs of Gustatory hearing and tactile responses: - Structure of hearing organs in different Phyla - mechanism of hearing - tactile organs.

SUGGESTED READING MATERIAL:

1. Alexander, R.M. The Chordata. Cambridge University Press,
2. London. Barnes, R.D. Invertebrate Zoology, III edition.
3. W.b. Saunders Co., Philadelphia. Barrington,
4. E.J. W. Invertebrate structure and function. Thomas Nelson and Sons Ltd., London.
5. Barrington, E.J. W. The Biology of Chordata and Protochordata. Oliver and Boyd, Edinburgh. Bourne, GH.
6. The structure and functions of nervous tissue. Academic Press, New York. Carter, GS.
7. Structure and habit invertebrate evolution Sedwick and Jackson, London. Eccles, J. C.
8. The understanding of the brain. McGraw Hill Co., New York and London. Hyman, L.B.
9. The Invertebrates smaller coelomate groups, Vol. V. Mc.GrawHill, Co., New York. Hyman, L.B.
10. The Invertebrates. Vol.2 Mc Graw Hill Co., New York and London. Hyman, L.B.
11. The invertebrates. Vol.I. Protozoa through Ctenophora, Mc Graw Hill Co., New York.
12. Hyman, L.H. The Invertebrates. Vol. 8. Mc Graw Hill Co., New York and London.
13. Jagerstein, G. Evolution of Metazoan life cycle, Academic Press, New York & London.
14. Kingsley, J.S. Outlines of Comparative Anatomy of Vertebrates. Central Book Depot, Allahabad.
15. Parker, T.J., Haswell, W.A. Text Book of Zoology, Mc Millan Co., London. Read,
16. C.P. Animal Parasitism. Prentice Hall Inc., New Jersey. Russel-Hwltter,
17. W.D. A biology of higher invertebrates, the Mc Millan Co. Ltd., London.
18. Sedwick, A. A student text book of Zoology, Vol.II and III. Central Book Depot, Allahabad.

ZOO-102: MOLECULAR BIOLOGY

UNIT-I : Molecular nature of Genome

- 1.1 Watson and Crick Model: Types of DNA; Properties of DNA(C-value paradox, Cot value)
- 1.2 Nuclear and mitochondrial genome
- 1.3 Structure of gene (Cistron, Muton, Recon, Cis-trans test) and Gene families: Simple multi gene families, Complex multi gene families.
- 1.4 DNA damage and repair: Biological indication of repair, photo reactivation, Excision repair, Recombination repair, SOS repair, and Mismatch repair.

UNIT-II: Replication:

- 2.1 Replication in Prokaryotes: Geometry of DNA replication, semi conservative replication.
- 2.2 Enzymology of DNA replication: DNA polymerase I, II and III; Replication of Eukaryotic Chromosomes; Eukaryotic DNA polymerases; Multiple fork; Replication of Chromatin.
- 2.3 Discontinuous Replication: Fragments in Replication fork and detection of fragments; Events in the Replication fork; De novo initiation and covalent extension.
- 2.4 Bidirectional replication, Termination of replication

Unit-III : Transcription and Translation:

- 3.1 Synthesis of RNA: RNA polymerase. Site selection I- The promoter, Siteselection II- Auxiliary proteins, RNA chain initiation, elongation, termination and release of newly synthesized RNA.
- 3.2 Classes of RNA molecules: Types, structure and processing of mRNA, rRNA and tRNA in E.coli. Transcription in eukaryotes, inhibitors of Transcription.
- 3.3 Outlines of Translation: the Genetic code; Types of codons, Basic composition of the codons.
- 3.4 Identification of the stop codons; Universality of the code, exception to Genetic code, Redundancy of the code, the decoding system; the codon and Anticodon. Interactions wobble Hypothesis, the Genetic code in mitochondria.

Unit-IV : Translation:

- 4.1 Ribosomes: Physical structure and chemical composition of prokaryotic and eukaryotic Ribosomes.
- 4.2 Protein synthesis: Directions of polypeptide chain growth and of mRNA; Initiation, Elongation and Termination of polypeptide chain; Role of GTP and antibiotics in protein Synthesis. Inhibitors of Translation, post translational modification of proteins, protein targeting and/targeting.
- 4.3 Gene regulation and its products: General aspects of the gene regulation in prokaryotes; Induction, Repression of Lactose Operons, Galactose Operon and Tryptophan Operon.
- 4.4 Gene regulation in Eukaryotes.

SUGGESTED READING MATERIAL

1. Biochemistry by A.L. Lehninger
2. Cell and Molecular Biology-E.D.P. De Robertis and E.M.F.
3. Concepts in Molecular Biology-S.C. Rastogi, VN. Sharma and Ananda Tandon (1993) Genes VII by Benjamin Lewin.
4. Harper's review of Biochemistry by D.W. Martin et al 1990
5. Molecular Biology by David Freifelder, 1993

ZOO-103: INTRODUCTION TO COMPUTER APPLICATIONS & BIOINFORMATICS

UNIT-I : Introduction to Computers

- 1.1 History of Computers, classification of computers, computer generations
- 1.2 Input, output processing and storage devices - Floppy disk, hard disk, CD-ROM, DVD, Digital devices etc.,
- 1.3 Operating system – Introduction – types of operating systems – MS DOS, WINDOWS, LINUX
- 1.4 MS – ACCESS, FOXPRO

UNIT-II : Applications

- 2.1 Computer Graphics – graphic generation methods, uses of computer graphics, graphic forms
- 2.2 Internet concepts: Internet access tools, Web searching, e-mail, File transfer Protocol (FTP).
- 2.3 Word processing and presentation software MS – WORD, POWER POINT, EXCEL.
- 2.4 Use of commonly available statistical packages, such as SPSS, etc.

UNIT-III : Introduction to Bioinformatics, Genomics and Proteomics

- 3.1 Scope, importance and status of Bioinformatics
- 3.2 Internet basics; Tools for web search, Data retrieval tools; Database types; Sources of Web sites
- 3.3 Proteomics; Prediction of Protein structure and protein folding; Protein sequence databases; Submission of sequence to the database
- 3.4 Phylogenetic Analysis and Evolutionary Trees

UNIT-IV : Biological Databases and Emerging areas of Bioinformatics

- 4.1 Homology-BLAST- types of BLASTs
- 4.2 Mapping of genome; Prediction of gene structure, Functional genomics.
- 4.3 DNA microarrays.
- 4.4 Human genome project

SUGGESTED READING MATERIAL:

1. Basic Bioinformatics by S. Ignaeimuthi, SJ. Narosa publications, 2005.
2. Bioinformatics by Andreas D. Baxevanis and B.P. Francis Ouellette, 2nd Ed., 2002.
3. Bioinformatics, Methods and Applications, Genomics proteomics and drug discovery, S.C. Rastogi, N. Mendiratla and P. Rastogi, prentice-Hall ofIndia, 2004.
4. Bioinformatics. Murthy, C.S.V. Himalaya Publishing House, Hyderabad.
5. Computers to-day by Suresh K.Basandra (1999), Published by Galgotia publications, Pvt.Ltd., New Delhi.
6. Database processing by D.M. Kroenke, Galgotia publications, 1990.
7. Introduction to Bioinformatics, S. Sundara Rajan and R. Balaji, Himalaya Publishing House, 2003.
8. Microsoft Office, by Setultz, 1997.

ZOO-104: TOOLS & TECHNIQUES AND BIO-STATISTICS

UNIT-I : Instrumentation

- 1.1 Chromatography: Adsorption material – Paper, silica gel, cellulose acetate. Merits and limitations. Molecular sieve chromatography: Principle, Determination of void volume and molecular mass of native molecules. Ion exchange chromatography: Ion exchange materials – Cation and anion exchange materials. Principle and separation of charged molecules. Principle and application of TLC and HPLC.
- 1.2 Spectroscopy, Centrifugation and X-ray Refraction MALDI.
- 1.3 Electrophoresis: principle, Matrices and used in electrophoresis – starch, cellulose acetate, agarose and acrylamide. use of PAGE for separation of proteins, molecular mass determination. Separation of nucleic acids using agarose gel electrophoresis. Pulse field electrophoresis and isoelectric focusing.
- 1.4 Blotting techniques: western, southern and northern blotting techniques.

UNIT-II : Tissue Culture

- 2.1 Introduction to cell and tissue culture: Preparatory techniques – cleaning, sterilization, sterile handling tissue culture laboratory requirements, Design of tissue culture laboratory: Equipments and purpose.
- 2.2 Cell types (Primary and secondary) and cell lines, Cell proliferation measurements, Cell viability testing: Dye inclusion and dye exclusion tests. facts.
- 2.3 Culture media : composition, preparation and sterilization, macro and micro nutrients, Importance of serum and limitation with serum media, cell harvesting methods.
- 2.4 The biology of stem cell : overview; different types of stem cells – embryonic stem cells, fetal tissue stem cells, adult stem cells, stem cell nuclear transfer ; somatic cell nuclear transfer, Animal cloning.

UNIT-III : Introduction and Scope of Biostatistics

- 3.1 Definition of statistics: Biostatistics, classification, variables and attributes, Diagrammatic distribution of biological data.
- 3.2 Measures of location and dispersion: Arithmetic mean, median and mode. Mean deviation, quartile deviation, Standard deviation and co-efficient of variation.
- 3.3 Curve fitting: Fitting straight line, parabola exponential curve and geometric curve to the data. Fitting of straight line using Ms-Excel.
- 3.4 Correlation and regression: Scatter diagram, types of relationship . Positive and negative correlation, computation of correlation coefficient, Interpretation of correlation coefficient. Simple regression lines and its interpretation.

UNIT-IV : Statistical Tests

- 4.1 Normal probability distribution & its applications.
- 4.2 Tests of significance: level of significance, null and alternative hypothesis, power of test and p-value of a test.
- 4.3 Student t- test for one a sample and two samples means-paired t-tests.
- 4.4 F-test, chi square test and their application, concept of ANOVA.

SUGGESTED READING MATERIAL:

1. A Biologists Guide to Principles and Techniques of Practical Biochemistry, K. Wilson & K.W. Goulding, ELBS Edn.
2. Animal Cell Culture – A practical approach, Ed. John. R. W. Masters IRL Press.
3. Bio-Statistics- An introductory text-Goldstein, A The Macmillan Co., New York, 1971.
4. Biostatistics by Lewis Alvin (1971) Affiliated East West Press pvt., Ltd., New Delhi.
5. Bio-Statistics- By Lewis Alvin E. Affiliated East-West press (P) Ltd., 1971.
6. General Zoological Microtechniques - P.M. Weesner.
7. Interpretation and uses of Medical Statistics – G.J. Bourke & J.Mc.Gilvaray, Blovkwel Science Publication, London, 1969.
8. Introduction to Biostatistics – By Sokal – Rohlf (2nd Edn) Freeman International Editor (1973).
9. Introduction to Biostatistics by Holdan Bancroft (1962) Pual B.Hoobar Inc., New York.
10. Introduction to Instrumental analysis, Ronert Braun. McGraw Hill Intemational edition.
11. Principles and techniques of Biochemistry and molecular biology by Kein Wilson and John Walker, VII volume, Cambridge press Edition.
12. Probit Analysis by Finney, D.J.S. Chand & Co., Ltd., New Delhi.
13. Statistical analysis in Biology by Mather, K Chapman and Hall, London, 1972.
14. Statistical methods in Biology by Bailey Norman T.J.(1965) The English Language Book Society & The English University press Ltd.,

SEMESTER - II

ZOO-201: PHYSIOLOGICAL CHEMISTRY

UNIT-I : Metabolism of carbohydrates

- 1.1 Thermodynamic principles in biology.
- 1.2 Carbohydrate : structure and classification – Properties of Monosaccharides, Oligo and Poly-saccharides.
- 1.3 Major pathways of carbohydrate metabolism: Glycolysis – TCA cycle and their biomedical importance.
- 1.4 Gluconeogenesis - HMP Shunt - Metabolism of Galactose and Fructose.

UNIT-II : Metabolism of proteins

- 2.1 Classification of proteins, structure and properties of proteins
- 2.2 Bio synthesis of nutritionally non essential amino acids and their biomedical importance
- 2.3 Catabolism of proteins, and amino acid - Bio Synthesis of urea – Detoxification of Ammonia
- 2.4 Catabolism of carbon skeletons of amino acids- metabolic disease of phenylalanine - Catabolism - Conversion of amino acids to specialized products

UNIT-III : Metabolism of lipids

- 3.1 General structure of lipids and classification.
- 3.2 Biomedical importance of lipids – Beta-oxidation of Palmitic acid - Biosynthesis of long Chain fattyacids.
- 3.3 Metabolism of unsaturated fatty acids and Eicosanoids – Biomedical importance – Clinical Aspects.
- 3.4 Lipid transportation and storage - Cholesterol synthesis - Excretion.

UNIT-IV : Metabolism of nucleotides

- 4.1 Nucleotides Structure – types – Nomenclature –properties.
- 4.2 Metabolism of purine and pyrimidine nucleotides.
- 4.3 Regulation of pyrimidine nucleotide biosynthesis – Disorders of nucleotide catabolism – drugs and orotic aciduria.
- 4.4 Degradation of nucleotides – clinical disorders of nucleotide metabolism.

SUGGESTED READING MATERIAL

1. D. Voet and J.G Voet, Biochemistry, 1. Wiley & Sons.
2. David L. Nelson and Michael M. Cox, Lehninger; Principles of Biochemistry, McMillan Lange Medical
3. Robert K.Murrey, D.K. Granner, P.A. Mayes and V.W. Rodwell; Harper's Biochemistry, Worth Publishers.

ZOO-202: CELL BIOLOGY AND IMMUNOLOGY

UNIT-I : Internal organization of the cell:

- 1.1 Organization of Prokaryotic and Eukaryotic cell.
- 1.2 Membrane structure – Lipid bi layer and two dimensional structure – Fluidity of lipid bilayer – Assembly of lipid bi layer – Membrane proteins.
- 1.3 Membrane transport: Active transport – Passive transport – Diffusion – Osmosis – Ion channels - Membrane pumps.
- 1.4 Vesicular traffic and Protein sorting: Translocation of proteins in to mitochondria – Endoplasmic reticulum and Golgi - Endocytosis – exocytosis.

UNIT-II : Cell signaling:

- 2.1 Models of cell-cell signaling (steroid receptors, Nitric oxide and Carbon monoxide).
- 2.2 Functions of cell surface receptors (G-protein coupled receptors, Tyrosine kinases, cytokine receptors, receptors linked to other enzymatic activities).
- 2.4 Pathways of intracellular signaling transduction (c-AMP pathways, cyclic c-GMP, phospholipids and Ca^{2+} , Ras, Raf and MAP kinases).
- 2.5 Signaling in development and differentiation (the receptors tyrosine kinase, Ras, MAP kinase pathway in Drosophila, notch signaling).

UNIT-III : Cells and organs of the immune system

- 3.1 Cells of the immune system: Lymphoid cells, Mononuclear cells, granulocytic cells, Mast Cells
- 3.2 Organs of the immune system- primary and secondary lymphoid organs, lymphatic system
- 3.3 Antigens: Antigenic determinants or Epitopes, Immunogenicity, Haptens, Adjuvants
- 3.4 Innate (Non-specific): Anatomical barriers, Phagocytosis, Physiological barriers, Inflammatory barriers.

UNIT-IV: Acquired immunity

- 4.1 Humoral immunity: Immunoglobulins (fine structure of immunoglobulins and Classes); the complement system, Classical and alternate pathway, Inflammation.
- 4.2 Cell mediated immunity: Mechanism of cell mediated immunity; brief account on Antigen Presentation, Major Histocompatibility complex
- 4.3 Antigen-antibody interactions: Affinity, Avidity, Cross-reactivity, precipitation reactions and Agglutination reactions and ELISA.
- 4.4 Brief account on immunological disorders:
 - a) Tolerance to autoimmunity
 - b) Transplantation
 - c) Immunodeficiency diseases
 - d) Immunization (active and passive immunity)

SUGGESTED READING MATERIAL

1. An introduction to Immunology by C.Y. Rao, Narosa publishing house, 2002.
2. Cell and Molecular Biology by EDR De Robertis and EMR De Robertis Jr, Indian Edition, B.I. Publications, Pvt. Ltd.
3. Cell Biology (Fundamentals and Applications) By Gupta/ Jangir, 2001; Agrobios, India.
4. Harpers Review of Biochemistry, Murray, Granier, Mayes and Rodwell, Lange Medical Publications, 25th Ed.
5. Human Physiology by Stuart Era Fox, W.M.C. Brown Publishers, USA 1984 or Recent Edition.
6. Immunology introductory textbook by Nandini Shetty, Wiley Eastern Ltd.
7. Kuby, J. (1998) Immunology, W.H. Freeman and Company, New York.
8. Roitt, I., Brostoff, J. Male, D. (1999/2000) Immunology, 4th Edition. Harcourt Brace and Company Asia, Pvt. Ltd., Singapore.
9. The Cell (A Molecular Approach) by Geoffrey M. Cooper, 2nd Edn. 2000, ISBN.

ZOO-203: GENETICS AND GENETIC ENGINEERING

UNIT-I : Genetics

- 1.1 Concept of gene: Alleles, Multiple alleles and Pseudoalleles (ABO blood grouping, Bombay phenotype and Rh factor).
- 1.2 Extensions of Mendelian Principles: Pleiotropy, genomic imprinting, Penetrance and expressivity, phenocopy, sex linked, sex limited and sex influenced characters.
- 1.3 Linkage and Crossing over; Complete and incomplete linkage; lod score for linkage testing, somatic or mitotic crossing over, germinal or meiotic crossing over.
- 1.4 Gene mapping methods: Linkage maps, tetrad analysis, mapping with molecular markers, mapping with somatic cell hybrids.

UNIT-II : Genetics

- 2.1 Mutation: Types (Spontaneous, Induced, lethal, conditional, biochemical) causes, loss of function, gain of function, insertional mutagenesis.
- 2.2 Microbial genetics: Methods of genetic transfers – transformation, conjugation, Transduction and sexduction, mapping genes by interrupted mating.
- 2.3 Human genetics: Pedigree analysis, genetic disorders (Brachydactyly, Huntington's chorea, Sickle cell anemia).
- 2.4 Quantitative genetics: Polygenic inheritance, Types of quantitative traits (continuous, meristic and threshold); examples (skin color and height in humans), Mapping of Quantitative trait loci (QTL mapping).

UNIT-III: GENETIC ENGINEERING COMPONENTS

- 3.1 Molecular vectors: Cloning, Shuttle, Expression and Binary vectors.
- 3.2 Plasmids (PBR322, PUC18/19, Blue script), Viruses (λ gt 10, 11, λ ZAP).
- 3.3 Restriction endonucleases: Types, Properties and applications.
- 3.4 DNA and RNA Polymerases, Nucleases, Kinases, Phosphatases and Methylases. And ethics and IPR

UNIT-IV: MOLECULAR CLONING STRATEGIES AND TECHNIQUES IN GENETIC ENGINEERING

- 4.1 Generation of DNA fragments, RF digestion, Mechanical shearing, Duplex cDNA synthesis and chemical synthesis.
- 4.2 Joining of DNA fragments to vectors: Homopolymer tailing, Cohesive and blunt end ligation, linkers and adapters.
- 4.3 Introduction of recombinant DNAmolecules into selected host cells: Biological and Non-biological methods. Screening Techniques: Immunological and genetic hybridization.
- 4.4 Polymerase Chain Reaction (PCR) and its applications. Ethics, Intellectual Property Rights, Genetically Modified Organisms. RFLP and RAPD profiles in identification of DNA. Sequencing of nucleic acids: Maxam and Gilbert chemical degradation and Sanger's dideoxy chain termination method and site –directed mutagenesis for changing genes.

SUGGESTED READING MATERIAL

1. An introduction to modern genetics by Ch. Waddington
2. Basic Human Genetics- E.J. Mange, Arthur P. Mange. Indian Print, 1997.
3. Biotech's Dictionary of Genetic Engineering by Dinesh Arora.
4. D. Green; Philip Hiltner Richard M. Myers Sue. Klapholz; Harold Riethman Jane Roskams.
5. DNA cloning : Mammalian systems - A Practical Approach by D.M. Glover, B. D. Hames.
6. From Genes to clones Introduction to Gene technology by Ernst-L- Winnacker.
7. Genetic disorders of Man by M.R. Goodman.
8. Genetic Engineering and its Applications by P. Joshi
9. Genetics - Monrve W. Strickberger. 3rd Ed., May, 2000.
10. Genetics-K.B. Alluwallia-1985.
11. Genome Analysis - A laboratory Manual Volume-2 Detecting Genes by Bruce. Birren; Eric D.
12. Genome analysis - A laboratory manual volume-3 cloning systems by Bruce. Birren; Eric D. Green; Sue. Klapholz; Richard M. Myers & Harold Riethman Jane Roskams.
13. Genome Analysis - A laboratory manual Volume-4 Mapping Genomes by Bruce. Birren; Eric.
14. Green; Sue. Klapholz; Richard M. Myers Jane Roskam.
15. Molecular Biology of genes- Watson, J.D., N.H. Hopkins, J.W. Roberts, J.A. Steitz & A.M. Weiner. The Benjamin Cummings publishing company. Inc. Tokyo.
16. Molecular cloning by Sambrook.
17. Principles of Genetics - E.J. Gardner. M.J. Simmons & D.P. Snustad.

ZOO-204: ENZYMOLOGY

UNIT-I : General Properties of Enzymes

- 1.1 Introduction to enzymes- Nomenclature , Classification, Isolation & Purification of enzymes
- 1.2 Properties of enzymes-specificity of enzymes.
- 1.3 Enzyme Assays
- 1.4 Enzyme catalysis-General principles of catalysis.

UNIT-II : Kinetic properties of Enzymes

- 2.1 Kinetic theory and Collision theory
- 2.2 Effect of reactant concentrations (Rate constant, First order, Second order & Zero order reactions; Ramachandran plot; slope)
- 2.3 Effect of enzyme concentration, pH and Temperature.
- 2.4 Effect of substrate concentration, Determination of Kinetic constants (K_m and V_{max} ; Michaelis and Menten hypothesis).

UNIT-III : Regulation of Enzyme activity

- 3.1 Inhibition of enzyme activity (competitive, non-competitive, uncompetitive and mixed inhibition)
- 3.2 Kinetics of allosteric enzymes
- 3.3 Regulation of enzyme activity (Metabolic regulation), Catalytic efficiency of enzymes (Feed back inhibition, covalent modification)
- 3.4 Mechanism of enzyme action (Lock and Key; Induced fit model), catalytic site, Role of metalions.

UNIT-IV Economic importance of enzymes

- 4.1 Enzymes in clinical diagnosis, Therapeutic enzymes
- 4.2 Immobilized enzymes and their applications
- 4.3 Isozymes, Ribozymes, Hybrid enzymes
- 4.4 Enzyme engineering, economic importance.

SUGGESTED READING MATERIAL

1. Biochemical calculations by I.H. Segel 2nd Ed. John Wiley & Sons.
2. Biochemistry by D. Voet and J.G. Voet, J.Wiley & Sons.
3. Enzyme Kinetics by I. W. Segil.
4. Enzyme kinetics by D.V Roberties, Cambridge University Press.
5. Harper's Biochemistry by Robert K. Murrey, Peter A. Mayer, D.K. Granner, V.W. Rodwell, Lange Medical.

SRI VENKATESWARA UNIVERSITY :: TIRUPATI
S.V.U. COLLEGE OF SCIENCES
COMMON SYLLABUS FOR ALL P.G. COURSES (CBCS & NON-CBCS)
SEMESTER – II
HUMAN VALUES AND PROFESSIONAL ETHICS – I
Syllabus
(With effect from 2014-15)
(effective from the batch of students admitted from the academic year 2014-15)

- I. Definition and Nature of Ethics- Its relation to Religion, Politics, Business, Law, Medicine and Environment. Need and Importance of Professional Ethics- Goals – Ethical Values in various Professions.
- II. Nature of Values- Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values, Analysis of basic moral concepts- right, ought, duty, obligation, justice, responsibility and freedom, Good behavior and respect for elders, Character and Conduct.
- III. Individual and society:
Ahimsa (Non-Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya (Non possession) and Aparigraha (Non-stealing). Purusharthas (Cardinal virtues)- Dharma (Righteousness), Artha (Wealth), Kama (Fulfillment Bodily Desires), Moksha (Liberation).
- IV. Bhagavad Gita – (a) Niskama karma. (b) Buddhism – The Four Noble Truths – Arya astanga marga, (c) Jainism – mahavratas and anuvratas. Values Embedded in Various Religions, Religious Tolerance, Gandhian Ethics.
- V. Crime and Theories of punishment – (a) Reformatory, Retributive and Deterrent. (b) Views on manu and Yajnavalkya.

Books for study:

1. John S Mackenjie: A manual of ethics.
2. “The Ethics of Management” by Larue Tone Hosmer, Richard D. Irwin Inc.
3. “Management Ethics – integrity at work” by Joseph A. Petrick and John F. Quinn, Response Books: New Delhi.
4. “Ethics in Management” by S.A. Sherlekar, Himalaya Publishing House.
5. Harold H. Titus: Ethics for Today
6. Maitra, S.K: Hindu Ethics
7. William Lilly: Introduction to Ethics
8. Sinha: A Manual of Ethics
9. Manu: Manu Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil(ed.) G.C. Haughton.
10. Susruta Samhita: Tr. Kaviraj Kunjanlal, Kunjalal Brishagratha, Chowkamba Sanskrit series, Vol. I, II and III, Varnasi, Vol I OO, 16-20, 21-32 and 74-77 only.
11. Caraka Samhita: Tr. Dr. Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I,II,III Vol I PP 183-191.
12. Ethics, Theory and Contemporary Issues, Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.
13. Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, 1999.
14. An Introduction to Applied Ethics (Ed.) John H. Piet and Ayodhya Prasad, Cosmo Publications.
15. Text book for Intermediate logic, Ethics and Human Values, board of Intermediate Education & Telugu Academic Hyderabad.
16. I.C. Sharma Ethical Philosophy of India. Nagin & co Julundhar.

SEMESTER - III

ZOO-301: COMPARATIVE ANIMAL PHYSIOLOGY

UNIT-I : Comparative Animal Physiology-I

- 1.1 Aim and scope of physiology; General physiological functions and principles.
Validity of comparative approach of physiology
- 1.2 Feeding mechanisms and regulation: Nutrition, Autotrophs, Heterotrophs, Feeding Mechanisms, Digestion, Digestion in the mouth, Swallowing, Peristalsis, Digestion in the Stomach, Gastric secretion, Gastric juice, Regulation of Gastric secretion, Activities of Gastric Secretion, Digestion in the small intestine.
- 1.3 Comparative physiology of digestion: Mechanical treatment, Movement of gut contents, Chemical Action: intracellular digestion, extracellular digestion, The digestive tract and its Enzyme chain; Digestive enzymes: Carbohydrases, Lipases and Esterases, Proteinases, Other Digestive enzymes, Absorption.
- 1.4 Coordination of Digestive activities: Visceral Autonomic system, Gastro intestinal Hormones.

UNIT-II : Comparative Animal Physiology-II

- 2.1 Respiration and Metabolism: Types of respiration, Respiratory organs, Mechanism of Respiration
- 2.2 Circulation of body fluids: Major types of body fluids, Blood, General properties of blood, Composition of blood, Blood groups and Transfusions.
- 2.3 Patterns of nitrogen excretion among different animal groups: Introduction, Nitrogenous Waste Products, Morphology of the excretory system in different groups of animals, Mechanism of urine Formation.
- 2.4 Osmoregulation in different animal groups: Biological significance of water, Body compartmentation, Nature of the problem of osmoregulations in different environments, Invertebrate body fluid Regulation, Vertebrate body fluid regulation.

UNIT-III: Comparative Animal Physiology-III

- 3.1 Thermoregulation: Temperature as an environmental factor, Thermoregulation in Invertebrates, Thermoregulation in vertebrates.
- 3.2 Poikilothermic animals: Temperature relation in poikilotherms, Aquatic poikilotherms, Terrestrial Poikilotherms; Homoeothermic animals : Temperature relations of homeotherms, Physical heat Regulation, Chemical heat regulation.
- 3.3 Hibernation & Aestivation
- 3.4 Biological rhythms.

UNIT-IV: Comparative Animal Physiology-IV

- 4.1 Bioluminescence: Occurrence of bioluminescence among different animals, Mechanism of light Production, Control of bioluminescence, Functions of luminescence
- 4.2 Chromatophores and regulation of their function: Colour production, Chromatophore Pigments, Mechanism of action of chromatophore, Movement of pigment, Control of Chromatophores, Factors Influence in chromatophore system
- 4.3 Contractile elements in animals
- 4.4 Muscle structure and function – correlation.

SUGGESTED READING MATERIAL

1. C.L. Prosser. Comparative Animal Physiology. W.B. Saunders & Company
2. C.L. Prosser. Environment and Metabolic Physiology Wiley-Liss, New York.
3. R. Eckert. Animal Physiology. Mechanisms and Adaptation. W. H. Freeman & Company
4. Schiemdt-Nielsen. Animal Physiology. Adaptation and Environment. Cambridge
5. W.S. Hoar. General and Comparative Animal Physiology

ZOO-302: NEUROBIOLOGY

UNIT-I : Neuronal Organization and Functional Neuroanatomy of Mammals

- 1.1 Anatomical techniques: Golgi Silver stain; Cobalt chloride Back-filling; HRP method; Procion yellow staining.
- 1.2 Neurons and associated structures; Micro anatomy of neurons; Types of neurons and Glial cells.
- 1.3 Organization of the Central Nervous System (Spinal cord; Brain stem; Cerebral cortex).
- 1.4 Organization of the Peripheral nervous System (Sympathetic and Parasympathetic nervous system).

UNIT-II : Neurophysiological Mechanisms

- 2.1 Electrophysiological techniques (Voltage-clamp and Patch-clamp); Bioelectrical properties of Neurons-Neuronal excitability; The resting potential membrane potential; Nernst equation; Sodium and Potassium pump; Generation of the action potential; Propagation of nerve Impulse.
- 2.2 Molecular mechanism of Excitation Carrier protein; Ion channels; Gating mechanisms.
- 2.3 Synapses: Structure and Integration; Morphology and Ultra structure of synapse; Types of Synapses; Chemical transmission; Electrical transmission.
- 2.4 Second messenger systems: Cyclic AMP and GMP; G-protein; IP₃; Calcium and Calmodulin.

UNIT-III : Neurochemistry: Neurotransmitters and Neuromodulators

- 3.1 Chemical composition of the nervous system-Cerebro Spinal Fluid-CNS Barriers-Nerve Growth Factor.
- 3.2 Synthesis-storage-release and inactivation mechanisms and functions of the neurotransmitters. Viz. Acetylcholine & Catecholamines (Norepinephrine, Epinephrine, Dopamine and Serotonin).
- 3.3 Amino acid Neurotransmitters- Excitatory amino acids(Glutamate and Aspartate); Inhibitory Amino acids(GABA and Glycine).
- 3.4 Peptide Neurotransmitters: Oxytocin, Vasopressin, Substance-P and Cholecystokinin.

UNIT-IV : Neuropharmacology and Neurological disorders

- 4.1 Major drug classes-brief history-absorption-binding-tolerance-excretion-physiological and Behavioral Effects of the following drugs; Opium; Stimulants (Amphetamine, Cocaine, Nicotine and Caffeine)
- 4.2 Hypnotic and Anxiolytic drugs. (Barbiturates & Benzodiazepines); Mind altering drugs (Marijuana, LSD)
- 4.3 Drug abuse and treatment programs
- 4.4 Etiology, Pathology, Symptoms, Diagnosis and treatment strategies for the Neurological Disorders Viz. Schizophrenia, Depression; Epilepsy, Alzheimer's and Parkinson's Disease.

SUGGESTED READING MATERIAL

1. Basic Neurochemistry-G.J. Siegel, R.W. Albers, B.W. Agranoff, R. Katzman (1981) Little, Brown and company. Boston.
2. Introduction to Nervous system- T.H. Bullock, R. Cork, A. Graner (1977); W.H. Freeman & Co.
3. Mechanism of Drug Action on the Nervous System M.A.B. Brazil, R.W. Ryall. (1979), Cambridge University Press. Cambridge, London and New York.
4. Neuro anatomical Techniques, N.J. Strassman and T.A. Miller Springer Verlag, New York.
5. Neurobiology. Shepherd, G.M. Oxford University press, London.
6. Principles of Neural Science -E.R. Kandel and J.H. Schwartz. (1981); Elsevier North Holland. NY. Oxford.
7. Principles of Neuro Psychopharmacology- Robert S. Feldman, Jerrold S. Meyer and Lind F. Quenzer. Sinauer Associates, Inc. Publishers. Sunderland. Massachusetts.
8. The Bio Chemical basis of Neuropharmacology-J.R. Cooper, F.E. Bloom, & R.H. Roth. (1982); Oxford University Press, NY and London. York Heidelberg, Berlin, 1980.

ZOO-303: ENVIRONMENTAL BIOLOGY

UNIT-I : Biology of different environments

- 1.1 A general account on Biomes and their environments.
- 1.2 Fresh Water: Classification and Characteristics, eutrophication, seasonal changes.
- 1.3 Marine: Classification and Characteristics.
- 1.4 Terrestrial: Forests – Grass lands – Tundra – Desert.

UNIT-II : Energetics of Ecosystems

- 2.1 Trophic dynamic view of ecosystem and energy flow.
- 2.2 Ecological Energetics and productivity of ecosystems.
- 2.3 Impact of environmental factors on Energy flow.
- 2.4 Bioaccumulation and Biological magnification.

UNIT-III : Environmental pollution, Health hazards and Epidemiology

- 3.1 Air Pollution: Criteria and standards in India, health hazards and Toxicology – Green house gases and Green House Effect.
- 3.2 Water Pollution: Criteria and standards in India, health hazards and toxicology.
- 3.3 Role of environmental epidemiological studies and health indices in evaluation of environmental health hazards: environmental epidemiological episodes in India and Abroad.
- 3.4 Environmental Laws; Environmental Laws in India – legislation and Execution.

UNIT-IV : Environmental monitoring and Bioremediation

- 4.1 Biomonitoring, Biological monitoring programme.
- 4.2 Bio indicators and environmental monitoring, Environmental impact assessment.
- 4.3 Bioremediation: Need and scope of bioremediation, Environmental applications of bioremediation. Future out look of Bioremediation: Phytoremediation, Biotechnological cleaning up of the environment by plants.
- 4.4 Natural calamities and disaster management.

SUGGESTED READING MATERIAL

1. Animal Physiology - Adaptation & Environment. 4th Edition Knut Schmidt - Nielsen - Cambridge University Press.
2. Biochemical ecology and water pollution - PR Dugan, plenum press, London, 1972.
3. Biodegradation & Bioremediation - 2nd editon, Martein Alexander - Academic Press, 1999 USA.
4. Chemical and biological methods for water pollution studies R.K. Trivedy and P.K. Goel, 1984.
5. Current pollution researches in India - RK. Trivedy and P.K. Goel. Karad.
6. Ecology & Environment - P.D. Sharma, 1991.
7. Ecotechnology for pollution control and environmental management, enviromedia, Karad, RK. Trivedi.
8. Encyclopedia of environmental pollution and control, enviromedia, Karad, Vol. 1 &2, R.K Trivedi.
9. Environmental Biology and Toxicology-P.D. Sharma, Rastogi Publications, Meerut (India), 1998.
10. Environmental Physiology of desert organism. Ed.by N.F. Hadley - Dowden Huchinson and Ross, Inc.Penn.USA.
11. Environmental Science Research Volumes: Vol.1. Indicators of environmental quality - W.A. Thomas, 1972. Vol.3. Environmental pollution by pesticides - C.A. Edwards, 1974.
12. Field Biology & Ecology - Allen H Benton & E. Werner, JR, 1980.
13. Health hazards and human environment, World Health Organization (WHO) 1972.
14. Industrial Pollution - VP. Kudesia, 1990.
15. Methods in Environmental Analysis - Water soil and air by P.K. Gupta - Agrobios (India), Jodhpur, 2001
16. Pesticides in the environment - R White Stevens, MarcelDekker Inc. New York, 1971.
17. Practical methods in Ecology & Environmental Science, RK. Trivedy, Goel, Trisal, 1997.
18. The Ecology of waste water treatment - H.A. Hawkes pergoman press, 1963.
 - a. Vol.5 Environmental dynamics of pesticides - R. Hague and V.H. Preed, 1975.
19. Water Treatment and purification technology - W.J. Ryan, Agrobios (India), Jodhpur, 2002.

ZOO-304: TOXICOLOGY

UNIT – I : Basic concepts of Toxicology

- 1.1 Introduction and scope of toxicology.
- 1.2 Classification of xenobiotics.
- 1.3 Toxicity evaluation (Dose response relationships) LD 50, LC 50, ED 50.
- 1.4 Factors affecting toxicity (factors pertaining to chemical, exposure, surrounding medium and Organism). Exposure of Toxicants (Routes and sites of exposure, duration and frequency of Exposure).

UNIT-II : Mechanism and action of Toxicants on vital organs

- 2.1 Mechanism of toxic action of pesticides (Receptor concept, nature of receptors, theory of Toxicant – receptor interactions and mechanism of action of some pesticides).
- 2.2 Toxic effects of pesticides (Local and systematic effects, immediate and delayed effects, reversible and irreversible effects, blockade of oxygen transport).
- 2.3 Toxic response of liver (Factors in liver injury: Mechanism of liver injury).
- 2.4 Toxic response of Kidney (susceptibility of the Kidney to Toxic injury : Mediators of renal cell injury).

UNIT-III : Translocation and bioaccumulation of xenobiotics

- 3.1 Translocation of toxicants (Membranous barriers, absorption of toxicants, sites of absorption, Distribution of toxicants, storage depots and excretion of toxicants).
- 3.2 Biotransformation of Xenobiotics (Biotransformation sites, biotransformation enzymes, Biotransformation reaction and bioactivation).
- 3.3 Bioaccumulation of Xenobiotics (Bioconcentration, Bioaccumulation and Biomagnification Biomagnification of lipophilic and recalcitrant substances).
- 3.4 Toxicity of heavy metals like Mercury, Lead, Cadmium and Arsenic.

UNIT-IV : Xenobiotic effects and therapy

- 4.1 Xenobiotic effect on basic metabolisms (carbohydrates, proteins and lipids)
- 4.2 Teratogens and teratology
- 4.3 Antidotal therapy (Types of antidotes and antidotal procedures)
- 4.4 Safety evaluation of chemicals (Process of risk assessment and safety evaluation programmes)

SUGGESTED READING MATERIAL:

1. Casarett & Doull's – Toxicology – The basic science of poisons – C.D.Klassen, Mary, O.D.& John Doull.
2. Concepts of Toxicology Dr.Omkar, Vishal Publishing C. 2003.
3. Environmental toxicology of Pesticides – F.Mastimura, G.M.Boush and T.Misato.
4. Introduction to Biochemical Toxicology – E.Hodgson & F.E.Gutherie.
5. Pesticides action and Metabolism – O'Brien.
6. Pesticides and Human Welfare – D.L.Gunn and J.G.R.Stevens. Oxford University Press – 1978.
7. The encyclopedia of Americana – Vol.15.
8. Toxic interactions – R.S.Goldstein, W.R.Hewitt and J.B.Hook. Academic Press – 1990.

SEMESTER - IV

ZOO-401: EVOLUTION AND ANIMAL BEHAVIOUR

UNIT:I An account on theories of organic evolution and mechanism of evolution

- 1.1 Critical review of Darwinism.
- 1.2 Neo-Darwinism.
- 1.3 Isolation and role of isolating mechanisms in evolution.
- 1.4 Speciation and models of speciation (Allopatric, sympatric and parapatric).

UNIT:II Evolutionary Forces and Molecular Evolution

- 2.1 An account on the factors of evolution (i) Mutations (ii) Natural Selection (iii) Genetic Drift.
- 2.2 Basic patterns of evolution; Micro and Macro evolution.
- 2.3 Species and subspecies categories: (i) Morphological species (ii) Biological species
(iii) Sibling species (iv) Sub species
- 2.4 Evolution of Proteins, Aminoacid sequence and examples of protein evolution

UNIT-III Animal Behaviour

- 3.1 Habitat selection-food selection; Optimal foraging theory, Antipredator defenses.
- 3.2 Parental care in Fishes, Amphibians, Reptiles, Birds and Mammals.
- 3.3 Homing and territoriality; bird migration; orientation and navigation.
- 3.4 Social organization; Insects and Primates

UNIT-IV Hormonal control of Behaviour

- 4.1 Conditioning Learning: **Classical conditioning:** Laws of classical condition, Extinction, Discrimination; **Operant conditioning:** Skinners Experiment, Measures of Operant Strength, Partial Reinforcement, Reinforcement Schedules, Shaping behavior.
- 4.2 Cognitive Learning: Reasoning, Physiology of Reasoning, Insight learning, Sign learning, Latent Learning.
- 4.3 Neural basis of memory and theories and memory: Kinds of remembering redintegrative Memory, Recall, Recognition, Types of memory phenomenon, Organisation of semantic Memory, Two process Theory of memory: Long-term and Short-term memory.
- 4.4 The nature of forgetting and improving memory: Decay through discuse, Inference effect, Proactive Inhibition, motivated forgetting, chemical process of memory.

SUGGESTED READING MATERIAL:

1. Alcock, J. Animal behaviour: An evolutionary approach. Sinauer Assoc., Sunderland, Mass. USA.
2. An introduction to genetic analysis. Griffiths, A.J .F., J.B. Miller, D.T. Suzuki, R.C. Lewontin & W.M. Gelbark, W.H. Freeman and Company, New York.
3. Bradbury, IW. and S.L.Vehrencamp. Principles of animal communication. Sinauer Assoc. Sunderland, Mass. USA.
4. Clutton-Brock, T.H. the evolution of parental care. Princeton Univ. Press, Princeton,USA.
5. Dobzhansky, Th. Genetics and origin of species, Columbia University press.
6. Dobzhansky, Th., F.J. Ayala, GL. Stebbins and J .M. Valentine Evolution: Surjeet publications, New Delhi latest edition.
7. Eibl-Eibesfeldt,I. Ethology. The biology of behaviour. Holt, Rinehart and Winston, New York.
8. Gould, J.L. The mechanisms and evolution of behavior.
9. Hartl, D.L. A primer of population genetics, sinauer Associatesm Inc., Massachusetts.
10. P.A. Moody Introduction to Evolution II ed/latest: Kalyani publishers, New Delhi.
11. Peter Volpe E. Understanding Evolution, University Book stall, New Delhi.

ZOO-402: BIODIVERSITY AND WILD LIFE CONSERVATION

UNIT-I : Biodiversity an Introduction

- 1.1 Importance of wild life conservation - Need for biodiversity for present world.
- 1.2 Environmental pollution – Global environmental change – Biodiversity status – Biodiversity management.
- 1.3 Values of biodiversity –Threats of biodiversity changes in habitat – hunting –pollution etc.,
- 1.4 Conservation of biodiversity and modes of conservation.

UNIT-II : Biodiversity Conservation

- 2.1 Types of Biodiversity: Genetic biodiversity - species biodiversity - Domesticated Biodiversity.
- 2.2 In-situ and Ex-situ conservation.
- 2.3 Sanctuaries, National parks – wild life sanctuaries in Andhra Pradesh, Hot spots in India.
- 2.4 Indian case studies on conservation/ management strategy (Project tiger, Seshachalam Biosphere reserve).

UNIT-III : Concepts of Biodiversity

- 3.1 Remote sensing and GIS usage for conservation and case studies.
- 3.2 Role of government and non govt agencies in wild life management.
- 3.3 Human and animal conflicts and remedial measures.
- 3.4 Environmental impact assessment and methods of EIA in conservation.

UNIT-IV : Biodiversity Strategies

- 4.1 Study of signs and symptoms: Recording basic field observations, Foot prints, types of tracks, animal droppings, bird pellets etc.,
- 4.2 Wild life policy and legislation Indian board for wild life management protected areas network world heritage sites.
- 4.3 Wild life education and training – Voluntary organization involved in wild life conservation.
- 4.4 Wild life photography, bioethics bio safety protocols.

SUGGESTED READING MATERIAL:

1. A.K. Pandey - Taxonomy and Biodiversity.
2. Biodiversity Principles & Conservation, Kumar & Asija-published by Upadesh Purohit by Agrobios (India), Jodhpur, 2002.
3. Biodiversity-K.C. Agarwal, 1998.
4. Conservation Biology,Peggy I. Fieldler & Peter M. Kareiva, 1997.
5. Environmental impact assessment & management. Editors B.B Hosetti & A. Kumar, 1998, Daya Publishing House, Delhi.
6. Hosetti, B.B.Venkateswarlu, M. Trends in Wild life Biodiversity Conservation and Management.
7. K.C. Agarwal, Biodiversity (1998).
8. Kumar & Asija., Biodiversity Principles & Conservation, Published by Upadesh Purohit by Agrobios (India), Jodhpur, 2002.
9. M.Shamin Jairajpuri, Biological Diversity and Environment-CBS Publishers and Distributors, New Delhi, 1996.
10. T.I. Khan, YS. Shishodia, Biodiversity Conservation and Sustainable Development.
11. Wild life in India-V.V.Saharia, 1982, Natraco Pub., Dehradun.

ZOO 403-A: DEVELOPMENTAL BIOLOGY

UNIT-1 : Principles of developmental biology

- 1.1 Origin of germ line cells; Origin and mechanism of cell lineage; migration of germ cells to Genital ridges; Embryonic stem cells, Nuclear transplantation experiments.
- 1.2 Production of gametes and establishment of polarity and symmetry.
- 1.3 Leydig cells function; Endocrine regulation of vitellogenesis.
- 1.4 Fertilization; Cell surface molecules in sperm egg recognition; molecular events of post fertilization.

UNIT-II : Early development and cell communication

- 2.1 Cleavage, Blastula, Gastrulation in different animals. Molecular mechanisms determining germ layers formation; fate maps.
- 2.2 Potency, commitment, specification. Induction, competence, determination and differentiation.
- 2.3 Axes and pattern formation in Drosophila and Amphibia.
- 2.4 Cell aggregation and differentiation in Dictyostelium.

UNIT-III : Organogenesis in early development

- 3.1 Organogenesis and vertebrate development -vulva formation in Caenorhabditis elegans; Eye lens Induction.
- 3.2 Neural fold formation in vertebrates and limb development.
- 3.3 Regeneration – Types of regeneration, Axial patterning during regeneration.
- 3.4 Metamorphosis – Hormonal regulation of metamorphosis in insects and amphibians.

UNIT-IV : Sex determination, apoptosis and senescence during development

- 4.1 Environmental regulation of normal development
- 4.2 Sex determination in animals (The mechanism of mammalian primary sex determination Secondary sex determination; Hormonal regulation of the sexual phenotype)
- 4.3 Programmed cell death-Incidence of Apoptosis; Apoptosis during animal development; Apoptosis in metamorphosis and morphogenesis; Apoptosis during limb development: Biochemical & molecular mechanisms involved in Apoptosis.
- 4.4 Aging and Senescence- Reactive oxygen species and cell senescence; Dietary restriction and anti aging action: Genetic control of longevity; Age related diseases.

SUGGESTED READING MATERIAL:

1. Austen, C.R. and Short, R.V. Reproduction in Animals
2. Ethan Bier The Coiled Spring Harlsor Laboratory Press, NewYork
3. F.T. Longo, Fertilization, Chapman & Hall
4. Molecular Developmental Biology – 2008, T. Subramonian, Narosa Publishing House
5. R.G. Edwards, Human Reproduction
6. S.F. Gillbert, Developmental Biology, Sinauer Associates Inc., Massachusetts
7. Schatten and Schatten. Molecular Biology of Fertilization.

ZOO-403 B: ENDOCRINOLOGY

UNIT-I Endocrinology and gonadal hormones

- 1.1 Introduction to endocrinology-characteristic features of hormones
- 1.2 Anatomy, secretions and functions of endocrine organs pituitary, thyroid, adrenal and pancreas
- 1.3 Gonads and their hormones
- 1.4 Pheromones

UNIT-II Hormones and sexual cycles

- 2.1 Classification and chemical nature of hormones
- 2.2 Biosynthesis and secretion of hormones corticosteroid hormones-peptide hormones- catecholamines
- 2.3 Hormones regulation of female sexual cycles.
- 2.4 Hormonal regulation of spermatogenesis

UNIT-III Relationship of hormones and receptors

- 3.1 Nature of hormone action
- 3.2 Hormone receptors: receptor structure and evolution of population hormone receptors.
- 3.3 Structure and function of nuclear receptors.
- 3.4 Termination of hormone action, Hormonal related disorders- Pharmaceutical remedies.

UNIT-IV Hormones in industries

- 4.1 Growth hormones and factors-somatotropin and somatomedin-insulin prolactin placental Lactogen Neurotrophic growth factors-hematopoietic growth factors
- 4.2 Hormones and homeostasis (Ca_2^+ , glucose, PO_4 , water, temperature)
- 4.3 Hormonal regulation of carbohydrate, nitrogen and lipid metabolism
- 4.4 Hormones and metabolic disorders-pharmaceuticals and therapeutics.

SIGGESTED READING MATERIAL

1. Barrington. E.J.W. General and comparative Endocrinology Cambridge Press, Oxford.
2. Bentley, P.J. Comparative Vertebrate Endocrinology, Cambridge Press, Oxford.
3. Martin, C.R. Endocrine Physiology. Oxford Univ. Press, Oxford.
4. Prakash S. Lohar. Endocrinology-Hormones and human health-2005. MJP Publishers-Chennai.
5. Williams, R.H. Text Book of Endocrinology, W.B. Saunders Co., Philadelphia.

ZOO-404 A: ANIMAL BIOTECHNOLOGY AND MICROBIOLOGY

UNIT-I : Genetic engineering and cloning vectors

- 1.1 General Introduction and Achievements of Biotechnology
- 1.2 Genetic Engineering and r-DNA technology (Restriction endonucleases, DNA ligases, Topoisomerases, Methylases, Nucleases, Polymerases, Reverse transcriptase and their Properties and functions).
- 1.3 Cloning vectors (plasmids, Bacteriophages, Cosmids, Yeasts Shuttle vectors, Viruses, PBR-322 and its derivatives, S.V 40 and other vectors) used in Gene cloning.
- 1.4 Cloning Strategies and Screening Analysis of recombinants (Single colony hybridization Technique), immunologic test, Southern blotting.

UNIT-II: Applications of biotechnology

- 2.0 Application of Biotechnology in veterinary sciences
- 2.1 Transgenic (Technology) animals, super bugs
- 2.2 Multiple ovulation in farm animals Genetic recombination in Mammalian cells and embryos production of cattle embryos in vitro; Artificial insemination, in vitro fertilization, Embryo Transfer technology
- 2.3 Application of Biotechnology in Medicine, Production of monoclonal antibodies (Hybridoma Technology), Production of vaccines, Production of Growth Hormone.
- 2.4 Gene therapy (Adenosine deaminase deficiency disease (ADA); Duchenne Muscular disease (DMD); Haemophilia; Phenyl ketonuria, alkaptonuria, Thalassemia, etc.

UNIT-III: Introduction to Microbiology and Microbial Diseases

- 3.1 History and Scope of Microbiology
- 3.2 Microbial nutrition, growth and their control
- 3.3 Normal microbial flora of Human Body- Skin, Nose, Oral cavity, Pharynx, Respiratory tract, Eye, Ear, Stomach, Intestine, Genitourinary tract.
- 4.1 Microbial diseases and their control
 - a) Bacterial diseases - Tuberculosis, Plague, Anthrax, Tetanus, Cholera,
 - b) Viral diseases - Influenza, AIDS, Rabies, Hepatitis, Poliomyelitis
 - c) Fungal diseases - Superficial mycoses, Cutaneous mycoses, Subcutaneous mycoses & Systemic mycoses

UNIT-IV: Food and Industrial Microbiology

- 4.1 Microbiology of fermented food: Dairy Products, Meat and Fish, Microorganisms as Sources of food
- 4.2 Industrial Microbiology: Types of fermentation process, Types of fermenters, Down stream processing, Alcoholic beverages
- 4.3 Manufacture of various chemicals: Lactic acid, Acetic acid and Citric acid.
- 4.4 Therapeutic compounds: Antibiotics (penicillin), Industrial enzymes (Amylase, Protease and Lactase).

SUGGESTED READING MATERIAL

1. A text book of Biotechnology-RC. Dubey.S.Chand & Company Ltd., New Delhi -1996.
2. A text book on Biotechnology-(n Ed.) H.D. Kumar. EWP - Private Ltd., New Delhi -1998.
3. Animal Biotechnology-M.M. Ranga, Agrobios (India), 2000.
4. Biotechnology-Fundamentals & Applications-S.S .Purohit & S.K. Mathur, Agro Botonics-1999.
5. Biotechnology-V. Kumaresan. Saras Publication-1994.
6. C.M. Presscotts, J.P. Harley & D.A Klein Mc Graw Hill. WCB Publication 4th Edition.
7. Elements of Micro biology, by MJ. Pelzar, Jr & E.C.S Chan International students Edition, 1981, MCGRA WHill international Book Company, New Delhi. Microbiology
8. General Microbiology by C.B. Powar & H.F. Dagainawala 1st Edition, Himalaya Publishing House, Bombay, 1982.
9. Text Book of Microbiology, by R Aananthnarayan & C.K. Jayaram Panikar, 4th Edition, Orient Longmen, Hyderabad, 1990.

ZOO 404-B: BIO MEDICAL SCIENCES

UNIT-I: Hematological Disorders

- 1.1 Diseases of Red cells and bleeding disorders-Anemia and Hemophilia.
- 1.2 Diseases of white Blood cells, lymph node & spleen.
- 1.3 Inflammation-Acute and chronic – Granulomatous information & examples.
- 1.4 Mechanism of fever and wound healing-Injury repair

UNIT-II: Environmental and Nutritional Diseases

- 2.1 Major role of vitamins and deficiency syndromes
- 2.2 Nutritional excess & Imbalance (Obesity-Diet & system, diseases-Diet), Cancer, Health and exercise.
- 2.3 Inborn errors – Inborn errors of metabolic disorders
- 2.4 Congenital malformation, birth injuries

UNIT-III: Infectious Diseases

- 3.1 Categories of infectious agents-Influenza, Rabies, Encephalitis, Smallpox- Human viral Diseases & their pathogens
- 3.2 Bacterial Disease.
- 3.3 Respiratory infections-Gastro intestinal infections-Acidity, Amoebiasis, Ulcers pulmonary Disorders, Lung infection, Tuberculosis.
- 3.4 Sexually Transmitted Disease (STD), Infections of child hood & Adolescence –Meseals, Mumps, Poliovirus infections, whooping cough, diphtheria, Zoonotic and Vector born Infections-Malaria and Plague-Tropic infections, Leprosy and Filariasis

UNIT-IV : Diseases of various organs

- 4.1 Cardio vascular diseases & their tests Hypertension, Atherosclerosis, Angina, Arrhythmia.
- 4.2 Neuromuscular disorders & their tests paralysis,epilepsy,Algmiers
- 4.3 Kidney & liver disorders – their tests nephrotoxicity,Kidneyfailure,Hepatotoxicity Hepatitis.
- 4.4 Skin and Orthopedic disorders & their tests, Skin Rash, Allergy, Rheumatoid Arthritics, Bonecancer,osteroporosis,Bonedensity.

SUGGESTED READING MATERIAL

1. Harper's Biochemistry. International Edition McGran Hill.
2. N.V Bhagavan. Medical Biochemistry IV Edition Academic press
3. Robins. Pathologic Basis of Diseases V Edition W.B. Saunders Company
4. S. RamaKrishnan. Text book of Medical Biochemistry III Edition Orient Langman

ZOO-407: PATHOBIOLOGY

UNIT - I : Disease Concept

- 1.1 Disease and injury (communicable and non-communicable)
- 1.2 Local and systematic reactions of injury
- 1.3 Cellular reactions to injury
- 1.4 Inflammation and Immunological reactions

UNIT - II : Host Parasite Relations

- 2.1 Important human and veterinary parasites (Protozoan and helminthes)
- 2.2 Life cycle and biology of plasmodium, Trypanosoma, Ascaris, Schistosoma and Leishmania
- 2.3 Symptoms of the disease caused parasites
- 2.4 Host - Parasite interactions

UNIT – III: Vector Biology

- 3.1 Biology of house flies (*Musca domestica*) and mosquitoes (*Culex*, *Anaphiles*)
- 3.2 Arthropods as vectors of human diseases (Mosquitoes, Lice, Flies and Ticks)
- 3.3 Mode of transmission of pathogens by vectors
- 3.4 Vector Control methods- Chemical-, Physical-, Biological and Environmental control.

UNIT - IV : Haematology

- 4.1 Biochemical and micro chemicals studies.
- 4.2 Changes in the blood during infection & disease
- 4.3 Types of anaemia, Biochemical and Microscopic changes.

SUGGESTED READING MATERIAL

1. Animal parasites, their life cycles and ecology - O. W. Olsen.
2. Clinical Haematology - Dy. L. Aksencu & A. Dranaikota, 1972.
3. Principles of Pathobiology - Lavia, Mariano F.Hill, Rolla B. Oxford University Press, London, 1975.
4. Text book of Pathology - an introduction to medicine 6th edition Philadelphia. Lea & Febiger, 1953.
5. Veterinary clinical pathology, E.H. Coles D 1967.

ZOO-408: SERICULTURE

UNIT - I : The cultivation of mulberry

- 1.1 The Morphology and Physiology of mulberry plant.
- 1.2 Mulberry varieties.
- 1.3 Selection and Establishment of the mulberry field
- 1.4 Training and Harvesting methods & Management of mulberry field

UNIT - II : Rearing of Silkworms

- 2.1 Planning of Rearing of silkworm.
- 2.2 Preparation of Rearing, Rearing of young and advanced stage larvae.
- 2.3 Rearing and Environment
- 2.4 Mounting cocoons production and Harvesting of cocoons

UNIT - III : Diseases of Silkworm and Preventive measures

- 3.1 Viral diseases
- 3.2 Bacterial diseases
- 3.3 Fungal diseases
- 3.4 Other diseases of silkworm & Silkworm disease control measures

UNIT - IV : Silk Dying and Finishing

- 4.1 Machine & chemical finishing
- 4.2 Commonly used equipments and commonly used unit machines
- 4.3 Physical and Chemical testing methods for quality of products / semi finished products
- 4.4 Measurement of industrial effluents & Administration and improvement of
- 4.5 Sericulture Management

SUGGESTED READING MATERIAL:

1. Silkworm Rearing, Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi -1997.
2. Silk Dying and Finishing, Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi -2000.

SEMESTER – IV
HUMAN VALUES AND PROFESSIONAL ETHICS – II
COMMON SYLLABUS FOR ALL P.G. COURSES (CBCS & NON-CBCS)

Syllabus

(With effect from 2015-16)

(effective from the batch of students admitted from the academic year 2014-15)

- I. Value Education- Definition – relevance to present day - Concept of Human Values – Self introspection – Self esteem. Family values - Components, structure and responsibilities of family Neutralization of anger – Adjustability – Threats of family life – Status of women in family and society – Caring for needy and elderly – Time allotment for sharing ideas and concerns.
- II. Medical ethics- Views of Charaka, Sushruta and Hippocrates on moral responsibility of medical practitioners. Code of ethics for medical and healthcare professionals. Euthanasia, Ethical obligation to animals, Ethical issues in relation to health care professionals and patients. Social justice in health care, human cloning, problems of abortion. Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.
- III. Business ethics- Ethical standards of business-Immoral and illegal practices and their solutions. Characteristics of ethical problems in management, ethical theories, causes of unethical behavior, ethical abuses and work ethics.
- IV. Environmental ethics- Ethical theory, man and nature – Ecological crisis, Pest control, Pollution and waste, Climate change, Energy and population, Justice and environmental health.
- V. Social ethics- Organ trade, Human trafficking, Human rights violation and social disparities Feminist ethics, surrogacy/pregnancy. Ethics of media- Impact of Newspapers, Television Movies and Internet.

Books for study:

1. John S Mackenjie: A manual of ethics.
2. “The Ethics of Management” by Larue Tone Hosmer, Richard D. Irwin Inc.
3. “Management Ethics – integrity at work’ by Joseph A. Petrick and John F. Quinn, Response Books: New Delhi.
4. “Ethics in management” by S.A. Sherlekar, Himalaya Publishing House.
5. Harold H. Titus: Ethics for Today
6. Maitra, S.K: Hindu Ethics
7. William Lilly: Introduction to Ethics
8. Sinha: A Manual of Ethics
9. Manu: Manu Dharma Sastra or the Institute of Manu: Comprising the Indian system of Duties: Religious and Civil(ed.) G.C. Haughton.
10. Susruta Samhita: Tr. Kaviraj Kunjanlal, Kunjalal Brishagratha, Chowkamba Sanskrit series, Vol. I, II and III, Varnasi, Vol I OO, 16-20, 21-32 and 74-77 only.
11. Caraka Samhita: Tr. Dr. Ram Kraran Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I,II,III Vol I PP 183-191.
12. Ethics, Theory and Contemporary Issues, Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.
13. Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, 1999.
14. An Introduction to Applied Ethics (Ed.) John H. Piet and Ayodhya Prasad, Cosmo Publications.
15. Text book for Intermediate logic, Ethics and Human Values, board of Intermediate Education & Telugu Academic Hyderabad.
16. I.C. Sharma Ethical Philosophy of India. Nagin & co Julundhar.