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Syllabus for B.Sc. Zoology effective from the Batch 2020-2021						
Year:	III Year		Subject Code :	U18MZL501	Semester :	V
Major - 5	**Biostatistics and Bioinformatics**					
Credits:	5			Max. Marks. 75		

Objective: The course is aimed at introducing the students to understand the concepts of statistics in biology the field of Bioinformatics.

Course outcome: At the end of course the students shall able to
CO1. Recall the theory behind fundamental Bio statistical methods.
CO2. Define basic concepts of probability and statistics
CO3. Describe widely used bioinformatics databases.
CO4. Apply and interpret bioinformatics and statistical analyses with real biological data.

UNIT – I
Definition and scope of Biostatistics
Collection of data: Primary and Secondary data – methods of collection and sampling procedures
Variables: discontinuous, discrete and non-discrete, continuous
Classification of data
Presentation of data: tabulation
Diagrams and graphs: line diagram, bar diagram, pie diagram, histogram, frequency polygon and frequency curve.

UNIT – II
Measures of central tendency: Mean, median and mode.
Measures of Dispersion: Range, Quartile deviation, mean deviation, Standard deviation and Standard error.
(Computations needed for all the above measures based on biological data).

UNIT – III
Testing of Hypothesis - Null and Alternative hypothesis
Test of significance-Students t-test and Chi square test
(Computations needed for both the tests based on biological data)

UNIT- IV
Bioinformatics – definition – Literature databases- NCBI – Pubmed, GeneBank and Medline
Protein and Nucleic acid sequence databases – PIR, Swiss – Prot, DDBJ
Structure Databases PDB, SCOP & CATH,
Structure visualization tools - RasMol, Swiss PDB viewer.

UNIT- V
Pairwise Sequence Alignment –Scoring Matrices - PAM and BLOSUM- Z-score-Dot Plot – local and global alignment.
Database searching – FASTA and BLAST.
Multiple sequence alignment- Clustal W- Phylogenetic Tree – PHYLIP.

TEXT BOOK

1. Jerold H. Zar. 2012. Bio statistical analysis [2nd edition] .Prentice Hall International edition
2. Arthur. M. Lesk, Introduction to Bioinformatics, Oxford University Press, New Delhi, 2003

Suggested Readings:

1. Gupta S.P: Statistics. 2013. S. Chand and Co., New Delhi.
2. Baxevanis, A and Outllette. Bioinformatics- a practical guide to the analysis of genes and proteins,Willy – Interscience, Hoboken, NJ. USA 2005..
3. Higggins D.and Taylor, W. 2000 Bioinformatics: Sequence, Structure and Databanks. Oxford University Press, New Delhi.

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Syllabus for B.Sc. Zoology effective from the Batch 2020-2021						
Year:	III Year		Subject Code :	U18MZL502	Semester :	V
Major - 6	**Developmental Biology and Immunology**					
Credits:	5			Max. Marks. 75		

Objectives:
To study the ontogenesis and understand the Immunological principles.

Course Outcome: After completion of the course, the student will be able to
CO1.Relate with various stages of developing embryo
CO2.Describe the initial development al procedures involved in Amphioxus, frog and chick
CO3. Apply the concept in the field of Reproductive Technology
CO4. Analyze the basic immunological principles

UNIT – I
Historical perspective and basic concepts of Developmental Biology
Gametogenesis: Spermatogenesis and Oogenesis-significance of egg and sperm.
Fertilization: types, mechanism, morphological changes in gametes and block to polyspermy, & theories of fertilization.
Parthenogenesis-natural and artificial.

UNIT – II
Cleavage: Types of eggs, patterns and planes of cleavage
Cleavage in *Amphioxus* and frog.
Fate map: Fate map of *Amphioxus* and frog.
Morphogenetic movements - Gastrulation in *Amphioxus* and frog.
Organogenesis: Development of brain and heart in frog.

UNIT – III
Embryonic adaptations; Embryonic membranes and their functions in chick – placentation in mammals.
Family welfare - contraception (Tubectomy and Vasectomy).
Reproductive technology: Artificial insemination-cryopreservation-IVF-Embryo transfer – Test tube babies – amniocentesis -Bioethics.

UNIT- IV
Immunity: Types of immunity – Innate and acquired, Passive and active. Lymphoid organs: Primary lymphoid organs - Thymus, Bone marrow, Bursa of Fabricius, Tonsil, Peyer's patches; Secondary Lymphoid organs – Spleen and Lymph node.

UNIT-V
Immunoglobulins: Structure, functions and biological properties of immunoglobulin classes. Interaction of antigen and antibody. Auto immune diseases. Immune cells-T-cell, B -Cell and Macrophages.
Immunoprophylaxis – Immunization schedule for children.
Immuno deficiency – AIDS.

TEXT BOOK

1. Balinsky, B.I., Fabian, B.C., 2012 Introduction to embryology (Indian Student Edition) Cengage Learning India; 5 edition.
2. Kuby.J.1999, Immunology.W. H. Free man and Co., New York.

Suggested Readings:

1. Berril& Corp. Developmental Biology. McGraw Hill Book Company, MC., New York.
2. Jayaraj M S.An Introduction to embryology.VeerBalaRastogi Publication.
3. Verma, P.S., V.K. Agarwal and Tyagi, 1995.Chordate embryology. S. Chand & co., New Delhi.
4. Roitt.I.M 2000 Essential Immunology, Blackwell Scientific Publishers.

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Syllabus for B.Sc. Zoology effective from the Batch 2020-2021						
Year:	III Year		Subject Code :	U18MZL503	Semester :	V
Major - 7	**Animal Physiology**					
Credits:	5			Max. Marks. 75		

Objective:
To study the basic principles and physiology of various organs and organ systems of Animals.

Course Outcome: After completion of the course, the student will be able to
CO1.Recall dietary needs and digestion principles
CO2.Describe the functions of different organ systems and their adaptation
CO3. Apply the concept in the field of thinking and brain development
CO4. Analyze the hormonal interactions in animal with relation to environment

UNIT – I
Basic composition of nutrients: carbohydrates – proteins – lipids – vitamins & minerals
Balanced diet & BMR.
Structure and functions of gastrointestinal system.
Role of enzymes in food digestion
Food absorption & malnutrition.

UNIT – II
Structure and function of human lung - transport of respiratory gases, respiratory pigments - respiratory quotient – oxygen debt – anaerobiosis.
Types of heart in animals - Structure and functions of heart with reference to Man- blood pressure – electrocardiogram (ECG).
Mechanism of blood coagulation

UNIT – III
Excretion – kinds of excretory products – ammonotelic, urecotelic and ureotelic animals- Structure of mammalian kidney - Mechanism of urine formation.
Osmoregulation - euryhaline Vs stenohaline, osmoconformers Vs osmoregulators
Osmoregulation in Crustaceans and fishes.
Muscular system: Muscle tissue types-ultra structure of skeletal muscle, mechanism of muscle contraction.
Cori cycle – Theories of muscle contraction.

UNIT – IV
Nervous tissue – components of CNS- Structure and function of Neuron – types of neurons. Nerve impulse – Synapse – Synaptic transmission of impulses – Neurotransmitters. Receptors – Photo and phono receptors – Physiology of vision and mechanism of hearing.

UNIT- V
Sexual reproduction: in mammals (man). Male sex hormones - female sex hormones. Menstural cycle, Menopause, Pregnancy & Parturition.
Endocrinology: Structure, function and hormones of pituitary, thyroid, parathyroid, adrenal, islets of Langerhans.

TEXT BOOK

1. Sambasivaiah, Kamalakara rao and Augustine Chellappa 1990.A Text book of Animal Physiology and Ecology, S. Chand & co., Ltd., New Delhi – 110 055.

Suggested Readings:

1. Randall, D., Burggren, W., French, K., 1997. Eckert Animal Physiology: Mechanisms and Adaptations. (4th Edition) W. H. Freeman and Company New York.
2. Parameswaran, Anantakrishnan and Ananta Subramanyam, 1975. Outlines of Animal Physiology,S. Viswanathan [printers& Publishers] Pvt., Ltd.
3. William S. Hoar, 1976. General and Comparative Physiology, Prentice Hall of India Pvt., Ltd., NewDelhi.110 001.
4. Wood.D.W, 1983, Principles of Animal Physiology 3rd Ed.
5. Prosser,C.L. Brown, 1985, Comparative Animal Physiology, Satish Book Enterprise, Agra – 282 003.

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Syllabus for B.Sc. Zoology effective from the Batch 2020-2021						
Year:	III Year		Subject Code :	U18EZL501	Semester :	V
Elective - 1	**Bio -Instrumentation (Elective - I)**					
Credits:	3			Max. Marks. 75		

Objective:
To learn about the various biological instruments and their function available locally.

Course Outcome: After completion of the course, the student will be able to
CO1.Descscribe the principles of Microscopy
CO2.Demonstrate the principle o centrifugation and chromatography
CO3. Apply the concept in the field of Animal Cell culture
CO4. Analyze the genetic materials

Unit – I:

Microscope: Structure and functions of Light, Phase contrast, Fluorescence and Electron Microscope. Principle and Applications of pH meter, Colorimeter and Spectrophotometer.

Unit – 2:

Chromatography: Principle and applications of Thin layer, Paper, Gas liquid and High performance liquid chromatography. Centrifugation: types, Principle and applications. Separation of Subcellular Organelles by Ultracentrifugation.

Unit – 3:

Cytological techniques: Principle and applications of flowcytometry, Autoclave, Laminar air flow, CO_2 incubator, Inverted Microscope. Design of animal tissue culture laboratory. Cryotechnique – Cryopreservation of animal cells. Histological technique – Principle of tissue fixation, Microtomy, staining and mounting.

Unit – 4: Electrophoresis: Principle and applications of Agarose gel electrophoresis and SDS-PAGE. Principle and Applications of Immunoelectrophoresis, ELISA and Immunochromatography.

Unit – 5:

Principle and Applications of Southern, Northern and Western Blotting. Principle and applications of Polymerase chain reaction (PCR) & RFLP.

TEXT BOOK

1. Keith Wilson and John Walker, 2010. Principles and Techniques of Biochemistry and Molecular Biology. Cambridge University Press.

Reading materials

1. Boyer, Modern Experimental Biochemistry, Benjamin 1993.
2. P. Palanivelu, Analytical Biochemistry and separation techniques: Tulsi book centre, Lung complex 1st floor, Madurai – 625001.
3. Cooper. The Cell-A Molecular Approach. ASM 1997.
4. R. Ian Freshney: Culture of Animal Cells: A Manual of Basic Technique and Specialized Applications. Publisher**:** Wiley-Blackwell; 6th Revised edition (2 February 2011).

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Syllabus for B.Sc. Zoology effective from the Batch 2020-2021						
Year:	III Year		Subject Code :	U18EINP51	Semester :	V
Internship/ Project	**INTERNSHIP/PROJECT**					
Credits:	2			Max. Marks. 100		

Project/Internship Programme

There will be a project work/internship programme at the end of Semester IV as prescribed by the respective boards of studies, if applicable. The following guidelines / clarifications are offered for the Project with Viva-voce:

1. The project work/internship should be valued for 100 marks by the faculty mentor and one internal expert appointed by the COE.
2. The internship has to be done with the institution laboratory / micro / small / medium enterprise / Institutional workshop / training / consultancy research project etc. It should be a maximum of two weeks.
3. The students should prepare and submit a report about what he has observed and learnt in the training period. The topic of interest will be assigned by the faculty mentor along with the industrial supervisor.
4. The Project Report may consist a minimum of 20 and to a maximum of 50 pages.
5. The candidate has to submit the Project Report 30 days before the commencement of the V Semester Examinations.

Guidelines for Individual/ Team Projects and Field Reports

The aim of the individual/ team project/s is to develop an aptitude for research in Zoology and to inculcate proficiency to identify appropriate research topic and presentation.
The topics of biological interest and significance can be selected for the project. Project or Internship is to be done by a group not exceeding 5 students or individually. The project report should be submitted on typed A4 paper, 12 Font, 1.5 Space in spirally bound form and duly attested by the supervising teacher and the Head of the Department on the day of practical examination before a board of two Examiners for End Semester. The viva-voce based on the project is conducted individually. Project topic once chosen shall not be repeated by any later batches of students.
The project report may have the following sections:
1. Preliminary (Title page, declaration, certificate of the supervising teacher, content etc.)
2. Introduction with relevant literature review and objective
3. Materials and Methods
4. Result
5. Discussion
6. Conclusion / Summary
7. References.

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Syllabus for B.Sc. Zoology effective from the Batch 2020-2021						
Year:	III Year		Subject Code :	U18SZL501	Semester :	V
Skill Based - 3	**Fisheries and Aquaculture (SBS - III)**					
Credits:	2			Max. Marks. 75		

Objectives: To enumerate the fishery and aquaculture potential and practices in India and augment food production form aquatic resources. The syllabus will be helpful for an UG student is attending ICAR and other competitive examinations.

Course Outcome: After completion of the course, the student will be able to
CO1.Describe the Marine Fisheries resources of India
CO2.Understand the biology of fishes and crustaceans
CO3. Apply the concept in the field of freshwater aquaculture
CO4. Analyze and isolate the disease organisms and start his ownbusiness

UNIT – I
Capture fisheries - present status and scope – Inland and marine fisheries – Outlook of marine fisheries of India – Indian EEZ and its yield – pelagic fish resources – demersal fish resources – Exploitation of Oil sardine – seer fishes – mackerel – prawn (*F. indicus*).

UNIT – II
Biology of Indian major carps. Carp culture: collection of seeds – natural breeding, induced breeding, transportation of seeds. Shrimp culture: collection of seeds – induced breeding, culture practices. Edible oyster culture: collection of seeds – induced breeding, culture practices

UNIT – III
Types of Aquaculture: extensive - semi-intensive and intensive culture – monoculture - monosex culture – polyculture - cage culture - pen culture – seaweed culture - integrated fish farming – paddy cum fish culture - pig cum fish culture - sewage fed fish culture.

UNIT- IV
Fish feed: artificial feed – feed formulation – need - ingredients ratio - pellets. Live feeds and their culture: *Artemia* – rotifers - microalgae. Diseases of aquaculture organisms: bacterial, viral and fungal diseases – nutritional deficiency diseases.

UNIT – V
Methods of fish harvesting – craft and gears used for inland and marine fisheries - Fish preservation – fishery products – High value products from processing waste – socioeconomic status of fishery folk – fishing holidays – fishery education and research – role of government organizations - CMFRI – CIFT – MPEDA – CIBA-CIFE etc.

Student Activity: A one/two days visit to Fisheries research Institutes/Fisheries University/Fishing Harbour/Fish landing centre.

TEXT BOOK

1. Jhingran, V.G. 1991. Fish and fisheries of India. Hindustan Publishing Corporation (India), Delhi
2. Mohan Joseph Modayil and Pillai, N.G.K. 2007. Status and perspectives of Marine fishery research in India. CMFRI Publications, Kochi.

Suggested Readings:

1. Pillai, T.V.R., Aquaculture and the environment. 1st edition, Fishing news Books, England, 1992.
2. Pandian, T.J., Sustainable indian fisheries, 2001
3. S. Paulraj., Shrimp farming techniques, problems and solutions-1995
4. Kurian, C.V and V.O. Sebastian. Prawns and prawn fisheries of India IV edition 1993
5. Vijayan, K.K. et al., 2007. Indian Fisheries: A progressive outlook. CMFRI Publications, Kochi.
6. Mohan Joseph Modayil and Jayaprakash, A.A. 2003. Status of exploitory marine fisheries research of India. CMFRI Publications, Kochi.
7. Sandhu, G.S. 2010. A text book of fish and Fisheries of India. Wisdom Press, New Delhi.

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Syllabus for B.Sc. Zoology effective from the Batch 2020-2021						
Year:	III Year		Subject Code :	U18MZL601	Semester :	Vi
Major - 8	**Environmental Biology**					
Credits:	5			Max. Marks. 75		

Objective:
To realize the importance of interrelationship between every organism and environment.

Course Outcome: After completion of the course, the student will be able to
CO1.Understand the concept of animal and the living habitat
CO2.Demonstrate the principle of Environmental Laws in the Biosphere
CO3. Analyze the interrelationship between Organisms
CO4. Solve the environmental issues for sustainability

Unit I:
Parts of environments: Atmosphere, Hydrosphere, Lithosphere and Biosphere.
Types of media and substratum, and their interaction with organisms: Air, Water and Soil.
Environmental limiting factors and their influence on organisms: Temperature, Light.

Unit II:
Scope, divisions and branches of Ecology: Autecology and synecology
Concept, Structure, Boundary and functions of Ecosystem.
Biogeochemical cycles – Gaseous cycle Nitrogen and Sedimentary cycle Phosphate.

Unit III:
Characteristics of Population: Density, Dispersion, Natality, Mortality, Age distribution and Growth forms.
Characteristics of Community: Species diversity, Community dominance, Stratification, Ecotone and Edge effect, Ecological Niche and Ecological Succession.
Species interactions: Inter and Intra-specific interaction, Colony formation, Predation, Parasitism, Commensalism, Mutualism.

Unit IV:
Types of Ecosystems: Natural and artificial ecosystems - Varities of Ecosystems: Pond, Estuarine, Marine, Forest and Grassland.
Energy transfer: Production, Food chain, Food web, Trophic levels, Energy pyramids, Energy flow from comparative ecosystems.

Unit V:
Biodiversity and Conservation: Hot spots of Biodiversity, Threats to biodiversity, Biodiversity status of Globe and India; Invasive, Endangered and Endemic species of India. In-situ and Ex-situ conservation
Environmental Impact Assessment (EIA): Purpose and aim of EIA, Process of EIA, Participants of EIA, Impact Identification Methods, Diversification of EIA.

TEXT BOOK

1. Chapman J.L. and M.J. Reiss, 1999. Ecology Principles and Applications (2nd Edition), Cambridge University Press, Cambridge

Suggested Readings:

1. Odum, E.P.,1971. Fundamentals of Ecology (3rd Edition), Saunders College Publications, Philadelphia London, Toronto.
2. Odum, E.P., 1983. Basic Ecology (3rd Edition), Sanders College Publications, Philadelphia London, Toronto.
3. Singh, J.S., S.P. Singh and S.R. Gupta, 2015. Ecology, Environmental Science and Conservation (1st Edition), S. Chand Publications, New Delhi.
4. Kotal, R.L. and N.P. Bali. Concept of Ecology, Vishal Publications, New Delhi.
5. Arumugam, 2004. Concept of Ecology, Saras Publication, Nagarcoil.

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Syllabus for B.Sc. Zoology effective from the Batch 2020-2021						
Year:	III Year		Subject Code :	U18MZL602	Semester :	VI
Major - 9	**Economic Zoology**					
Credits:	4			Max. Marks. 75		

Objectives:
To encourage young learners to take up the small scale industries and provide opportunity for self-employment.

Course Outcome: After completion of the course, the student will be able to
CO1.Develop the techniques of Vermiculture, Apiculture and Sericulture
CO2.Design an aquaculture technique of his own
CO3. Plan a dairy farm of his own
CO4. Invent a new food or new breed of livestock

UNIT – I
Vermiculture and vermi composting – difference between vermiculture and vermi composting- Earthworm diversity – biology of composting earthworms – *Eoisena foeitida*, *Eudrilus lugeniae*. Verimiculture technique- Applications of vermi composting in agricultural and horticultural practices. Economics of vermi culture, nationalized bank NABARD support for vermi culture.

UNIT –II
Apiculture: Classification and Biology of Honey Bees, Rearing-Newton's Hive- Products of Apiculture Industry and its Uses (Honey, Bees Wax, Propolis), Pollen etc. Apiculture as a self-employment.
Sericulture: Types of silkworms, Distribution and Races- Selection of mulberry variety and establishment of mulberry garden. Rearing of larva - rearing house and rearing appliances. Sericulture industry in different states, employment potential in mulberry and non-mulberry sericulture.
Lac Culture

UNIT – III
Ornamental Fish culture: Exotic and Endemic species of Aquarium Fishes- Common characters and sexual dimorphism of Fresh water and Marine Aquarium fishes such as Guppy, Molly, Sword tail, Gold fish, Angel fish, Blue morph, Anemone fish and Butterfly fish- General Aquarium maintenance - budget for setting up an Aquarium Fish Farm as a Cottage Industry.

UNIT – IV
Dairy farm management, Milch breeds. Draft Breeds, Dual Purpose Breeds and New cross Breeds of Cows and Buffaloes in India.
Sheep farming: Indigenous and Exotic breeds of sheep

UNIT – V
Future strategies for Livestock Development – Genetic Improvement for best Breeds.
Economic importance of Leather, Wool and fur. Medicinal products from animals.

TEXT BOOK

1. Sukla, G.S. and Upadhyay, V.B., 2000, Economic Zoology – ISBN – 81- 7133 -137 -8 Rastogi Publication, Meerut, India.

Suggested Readings:

1. Jawaid Ahsan and Subhas Prasad sinha – 2000, A Handbook on Economic Zoolgy - ISBN – 81 – 219- 0876 – 0, S. Chand & co., Ltd., New Delhi.
2. Ashok Kumar and Prem Mohan Nigam, 1991, Economic and Applied Entomology, Emkay Publication, New Delhi.
3. Shammi,Q.J. and Bhatnagar, S., 2002, Applied Fisheries: ISBN – 81 – 7754 – 114 – 5, Agrobios [India], jodhpur – India.
4. Kaushish, S.K., 2001, Trends in livestock Research – ISBN – 81 – 7754 – 112 – 9, Agrobios [India], Jodhpur– India.
5. Ismail, S.A1997. Vermicology the Biology of Earthworm. Orient Longman, India.
6. Mary Violet chrishty 2008 Vermitechonology MJP Publ. Chennai.

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Syllabus for B.Sc. Zoology effective from the Batch 2020-2021						
Year:	III Year		Subject Code :	U18MZL603	Semester :	VI
Major - 10	**Evolution**					
Credits:	4			Max. Marks. 75		

Objectives:
To comprehend the scientific concepts of animal evolution through theories and evidences.

Course Outcome: After completion of the course, the student will be able to
CO1.Recall and relate the Origin of life and their evidences
CO2.Illustrate the various theories of Evolution
CO3. Contrast the principles behind Mimicry and Isolating mechanisms
CO4. Appraise the evolution of man

UNIT – I
Origin of Life-Theories-Evidences: The need of evidences for the fact of evolution – Morphological, Anatomical, Embryological, Physiological, Biochemical and Paleontological evidences.
UNIT – II
Theories: Lamarckism, Neo-Lamarckism, Darwinism, Neo-Darwinism, De-Vries concept of Mutation, Modern concept of Mutation theory.
UNIT – III
Natural selection: Types, stabilizing and diversifying directional selection, Variation: Types of variation.
UNIT-IV
Isolation mechanism - Premating and post mating.
Speciation - concept and types.
Evolution of man – Biological and cultural.
UNIT – V
Mimicry and colouration – Batesian and Mullerian mimicry and evolution, living fossils.Geographical distribution of animals.

TEXT BOOK
1. Veer Bala Rastogi. 2013. Organic Evolution, Meerut Publications.

Suggested Readings:

2. Agarwal, V.K and Usha Gupta – Evolution and Animal distribution, Chand and Co.
3. Dodson,E.O. 1990. Evolution, Reinhold, Newyork.Francisco, J.Ayla – Evolution, Surject publication.
4. Gopalakrishnan,T.S. IttaSambasivaiah and A.P.KamalakaraRao. Principles of organic Evolution,Himalaya publishing house.
5. T.K.Ranganathan, Evolution.1994 Rainbow Printers, Palayankottai.
6. Arumugam, N. Organic Evolution, 2009. Saras Publishers,.Nagarcoil, Kanyakumari Dt.

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Syllabus for B.Sc. Zoology effective from the Batch 2020-2021						
Year:	III Year		Subject Code :	U18EZL601	Semester :	VI
Elective - 2	**Biochemistry (Elective - II)**					
Credits:	3			Max. Marks. 75		

Objective:
To define and explain the basic principles of biochemistry.

Course Outcome: After completion of the course, the student will be able to
CO1.Define the basic structure of atom and their interaction
CO2.Compare the functions of various enzymes in our body
CO3. Classify the carbohydrates, proteins and Lipids
CO4. Distinguish the various metabolic process

UNIT – I
Introduction – structure of an atom, molecule – chemical bonds — pH and buffers– Structure and properties of water - hydrogen ion concentration, acids and bases and their concept.
UNIT – II
Enzymes and co-enzymes – classification and nomenclature - functions, substrate specificity, factors influencing the enzyme action. Chemistry of DNA and RNA. Nitrogenous bases - Structure and functions of purines and pyrimidines.
UNIT – III
Carbohydrates – classification, structure, properties and functions-metabolic pathways - glycolysis, Kreb's cycle and electron transport chain.
UNIT – IV
Protein – classification, structure, properties and functions – amino acids – classification, structure, properties and functions– metabolism of protein – deamination, transamination – trans deamination - Inborn errors in amino acids metabolism. Brief account on heterocyclic compounds - antibiotics - bacterial cell wall inhibitors - structure and functions of Penicillin, Tetracycline and Streptomycin.
UNIT – V
Lipids – classification, structure, properties and functions - fatty acids, triglycerides, wax and their properties.Lipid metabolism – ß-oxidation-role of liver in fat metabolism – metabolism of cholesterol.

TEXT BOOK

1. Nelson, D. L., Cox, M, 2018. Lehninger Principles of biochemistry (6th edition). Macmillan Publishers and Distributors, New Delhi-32.

Suggested Readings:

1. Shanumugam, A., 1977. Fundamentals of biochemistry for medical students. Nava Baharat Printers and Traders, Madras-6.
2. Stryer, L., W. H., 1995. Biochemistry. Freeman and Company, San Francisco.
3. Murray, R. K., Granner, D. K., Mayes, P. A. and Rodwell, V. W., 1996. Harper's biochemistry (24th edition). Prentice Hall of Japan, Inc., Tokyo.
4. West E. S., Todd, W. R., Mason, S. H. and Van Bruggen, J. T., 1974.Textbook of biochemistry (4th edition). Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi-2.
5. Kuchel P.W & G. B. Ralston, 2003. Schaum's outlines of biochemistry (2nd edition). Tata McGraw-Hill Edition.
6. S. C. Rastogi. 2003. Biochemistry (2nd edition). Tata McGraw-Hill Publishing Company Ltd.

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Syllabus for B.Sc. Zoology effective from the Batch 2020-2021						
Year:	III Year		Subject Code :	U18EZL602	Semester :	VI
Elective - 3	**Wildlife Conservation (Elective - III)**					
Credits:	3			Max. Marks. 75		

Objectives:
Objectives: To make the students equipped with principles and applications of various wildlife management techniques

Course Outcome: After completion of the course, the student will be able to
CO1.Explain the basic ideas and laws behind Animal Conservation
CO2.Demonstrate the various survey techniques and population estimation methods
CO3. Apply the laws in Human-Animal conflicts and experiment with case studies
CO4. Survey and Take part in Animal Conservation Campaign

Unit I:
Wildlife Management: Basic concepts and principles - Wildlife management before and after implementation of Wild Life (Protection) Act, 1972 – IUCN – WWF - CITES – NBA – IBA – Project Tiger – Project Elephant – Project Crocodile. List of endangered species.

Unit II:
Evaluation of Wildlife habitat: Define habitat – Forest habitat types - basic survey techniques of habitats – Vegetative analyses – Point centered quadrat, Quadrat, strip transect – Habitat manipulation: Food, Water, shade, impact and removal of invasive alien species

Unit III:
Population Estimation: Basic concepts and applications - Direct count (block count; transect methods, Point counts, visual encounter survey, camera trap, aerial photography and waterhole survey,). Indirect count (Call count, track and signs, pellet count, pugmark, DNA finger printing).

Unit IV:
Human-animal Conflicts: Basic concepts, reason for conflicts, Identification of damages caused by wild animals and control measures. Case studies – Elephant, gaur, wild boar, monkey, tiger and leopard, Translocation of Wild animals – Principles, Methods and application.

Unit V:
Zoos, Zoological Parks, Wildlife Sanctuaries, National Parks & Tiger Reserves
In-situ and ex-situ conservation techniques
Case studies (Arignar Anna Zoological Park, Mudumalai and Periyar Tiger Reserves - Nilgiri Biosphere Reserve).
(Student activity: One day visit to Zoo/Zoological Park or 2-3 days Forest visit)

TEXT BOOK

1. Ranga, M.M., (2012) Wildlife Management and Conservation (2nd Ed.) Agrobios Publications.

Suggested Readings:

1. Saharia, V.B. 1982 Wildlife in India, Nataraj Publishers, Dehra Dun
2. Seshadri, B.1986 India's Wildlife reserves , Sterling Pub'rs Pvt. Ltd., New Delhi
3. Giles, R.H. Jr. (Ed) 1984. Wildlife Management Techniques 3rd edition.The wildlife Society, Washington. D.C. Nataraj Publishers,Dehradun. India
4. Dasmann, R.F. 1964, Wildlife Biology. John and Wiley and sons Newyork. Pp231.
5. Robinson, Wl. and Eric, G. Bolen, 1984. Wildlife Ecology and Management Mac Millan Publishing Co, Ny. Pp 478.

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Syllabus for B.Sc. Zoology effective from the Batch 2020-2021						
Year:	III Year		Subject Code :	U18SZL601	Semester :	VI
Skill Based - 4	**Medical Laboratory Techniques (SBS - IV)**					
Credits:	2			Max. Marks. 75		

Objectives: To impart awareness on Clinical Lab Technology and creating Self-Employment Opportunity.

Course Outcome: After completion of the course, the student will be able to
CO1.Define and Describe the basic rules of Medial lab Technician
CO2.Design and demonstrate the various disease detection techniques
CO3. Apply the learned technique and examine human pathogens
CO4. Plan a proper code of ethics

UNIT – I:
Scope of Medical Lab Technology, Medical laboratory personnel – code of conduct - laboratory management and maintenance - safe disposal of hospital waste - laboratory requirements. Sterilization methods: physical agents-dry heat - hot air oven, moist heat - autoclave, pressure cooker; chemical agents; ultraviolet radiation. Haemocytometry, Red cell indices (MCV, MCH, MCHC).

UNIT – II:
Haematopoietic system - Erythropoiesis, Lecopoiesis, Thrombopoiesis. Collection of blood samples, composition of blood, plasma, serum, Total RBC andWBC count, Estimation of Heamoglobin Erythrocyte Sedimentation Rate (ESR). Packed Cell Volume (PCV), Reticulocyte count, Differential count, Basic principle of blood transfusions.

UNIT – III:
Semen analysis: Sperm count, abnormal sperms, common pathological conditions detected in semen – their causes.
Pregnancy test (detection of hCG), Amniotic fluid: sex determination, amniocentesis.
Anaemia- classification, Blood clotting factor, Mechanism of coagulation, anticoagulants.

UNIT – IV:
Urine: Physical examination, blood cells, urine glucose, urinary albumin, bile salts, ketone bodies, Urine culture – Antibiotic susceptibility test.
Faeces (stool): Components of faeces and their characteristics, factors affecting faecal composition, Occult blood in stool.
Sputum: Analysis of sputum – Pathological conditions that can be detected in sputum – their causes.

UNIT – V:
Clinical diagnosis of diseases and detection techniques: Typhoid, Cholera, Tuberculosis, Polio, Measles, Amoebiasis and Filariasis.
Detailed account and life cycle- *Plasmodium sp, Entamoeba histolytica, Trypanosoma gambiens, Ascaris lumbricoides* and *Taenia solium.*

TEXT BOOK

1. Mukherjee, 2006: Medical Laboratory Technology Vol. I, II & III – Tata McGraw Hill Publ.Co., Noida– India.

Suggested Readings:

1. Samuel, K.M. 1992: Notes on Clinical Lab Techniques. M.K.G. Iyyer& Sons Publ. Co., Chennai – India.
2. Dubey, R.C., and Maheswari, D.K.2007; A text book of Microbiology, S. Chand and Co. Publ. NewDelhi – India.
3. Purohit, S.S. 2005: Microbiology – Fundamentals and Applications [6th Edition], Student Edition – Jodhpur – India.
4. Ochei, 2000: Medical Laboratory Science – Theory and Practice – Tata McGraw Hill Publ, Co., - Noida – India.

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Syllabus for B.Sc. Zoology effective from the Batch 2020-2021						
Year:	III Year		Subject Code :	U18MZLP61	Semester :	VI
Practical - 3	**Practical - III Animal Physiology, Developmental Biology and Immunology**					
Credits:	3			Max. Marks. 75		

Objective: To learn the various animal experiments in relation to Physiology, Developmental Biology and Immunology

Course Outcome: After completion of the course, the student will be able to
CO1.Demonstrate the various animal physiology experiments
CO2.Recall and design the animal development experiments and
CO3. Plan various immunological techniques

ANIMAL PHYSIOLOGY:
Study of human salivary amylase in relation to temperature.
Estimation of Oxygen consumption in a fish with reference to body weight.
Detection of nitrogenous waste products in fish tank water (ammonia), bird excreta (Uric acid) and mammalian urine (urea).
Use of Kymograph Unit, B.P. apparatus, Stethoscope.

DEVELOPMENTAL BIOLOGY:
Study of the following prepared slides / museum specimens:
Section of testis and Ovary [Mammalian]
Slides of Mammalian sperm and ovum.
Study of Egg types – Frog's Egg, Hen's Egg.
Study of cleavage stages: 2 Cell, 4 Cell & 8Cell – Blastula and gastrula of Frog.
Slides of different stages of chick embryo – 18 hours [primitive streak stage], 24 hours, 48 hours and 96 hours.
Placenta of Sheep and Man.

IMMUNOLOGY:
Study of Antigen – Antibody reaction – Human Blood grouping [ABO and Rh]
Study of prepared slides of histology:
Thymus
Spleen
Bone marrow
Lymph node.

*Students have to participate in educational visit programme in connection with the syllabus mentioned above (mandatory-at least three Research Institute like CMFRI, CIBA, CIFE or University Departments from other states to learn the various facilities and job/research opportunities) and submit a detailed report for their internship programme.

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Syllabus for B.Sc. Zoology effective from the Batch 2020-2021						
Year:	III Year		Subject Code :	U18MZLP62	Semester :	VI
Practical - 4	**Practical - IV Environmental Biology, Economic Zoology and Evolution**					
Credits:	3			Max. Marks. 75		

Objective: To learn the perform environmental analysis methods and to study the various animals of economic importance

Course Outcome: After completion of the course, the student will be able to

CO1.Demonstrate the various ecological experiments

CO2.Identify various economically important animals.

ENVIRONMENTAL BIOLOGY:

Estimation of Dissolved oxygen, CO_2, salinity, pH, Free Carbonate and Bicarbonates in water samples and TOC in sediment samples.
Use of Rain gauge, Maximum and Minimum thermometer and Hygrometer.
Plankton study – fresh water and Marine planktons.
Study of natural ecosystem and field report.

ECONOMIC ZOOLOGY:

Study of the following prepared slides / specimens
Vermiculture: Earthworm types [any two] *Megascolex mauritii*; *Drawida modesta*; *Pheretima posthuma*; *Eudrilus eugeniae*.
Apiculture: Honey bee Colony, Bee Hive
Sericulture: Stages of Silkworm, Muscardine and Pebrine disease
Lac culture: Kusumi and Rangeeni – male and female. Lac seal
Ornamental fish culture – Guppy, gold fish.
Dairy farm breeds any two (Cow and Buffalo)
External parasites of farm animals – Ticks and mites.
Dairy Industry products: Fur and wool,
Leather specimen - Goat and sheep
Processing and tanning (Visit to nearby tannery unit and photographs should be pasted in record).

EVOLUTION: Spotters/Charts/Specimens

(Limulus, Nautilus, Ammonite, Stick insect, Peripatus**)**

*Students have to participate in educational visit programme in connection with the syllabus mentioned above (mandatory-visit to Ariyalur, Natural History Museum or University Departments from other states to learn the various facilities and job/research opportunities) and submit a detailed report for their internship programme.