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Syllabus for B.Sc. Zoology effective from the Batch 2015-2016

Year: III Year Subject Code : U15MZL501 Semester : V

Major - 5 Title: **Biostatistics and Bioinformatics**

Credits: 5 Max. Marks. 75

Objective:

To get a basic knowledge of statistical methods and computations in biology.

To study the application of information sciences [mathematics, statistics and computer sciences]in biology.

To study the application of information technology to the management and analysis of biologicaldata.

UNIT – I

Definition and scope: collection and analysis of data – collection and methods of sampling. Variables: discontinuous, discrete and non-discrete, continuous - classification – Presentation of data: tabulation - diagrams and graphs: line diagram – bar diagram – pie diagram – histogram – frequency polygon.

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-goodness of fit test-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, Medline, Protein and Nucleicacid sequence databases – PIR, Swiss – Prot, GeneBank, 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.

Reference Books:

Gupta S.P: Statistics2013. S. Chand and Co., New Delhi.

Jerold H. Zar Biostatistical analysis [2nd edition] .Printice Hall International edition, 2012[Relevant portions]

Arthur. M. Lesk, Introduction to Bioinformatics, Oxford University Press, New Delhi, 2003

Baxevanis, A and Outllette. Bioinformatics- a practical guide to the analysis of genes and proteins,Willy – Interscience, Hoboken, NJ. USA 2005..

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Syllabus for B.Sc. Zoology effective from the Batch 2015-2016

Year: III Year Subject Code : U15MZL502 Semester : V

Major - 6 Title: **Developmental Biology & Immunology**

Credits: 5 Max. Marks. 75

Objectives:

To study ontogenesis, the development of animals including parthenogenesis.

To study embryonic adaptations, human reproduction and reproductive technology in man.

To study the processes which help to maintain the organisms' internal environment, when challenged with foreign substances.

To understand the advances in Immunology.

UNIT – I

Spermatogenesis and Oogenesis – comparative study of invertebrate and vertebrate sperm and eggs, polarity& symmetry of eggs – Fertilization Mechanism, Physiology & theories – parthenogenesis.

UNIT – II

Cleavage: Types of animal eggs; patterns of yolk on cleavage; cleavage rules; germ layers; cell lineage. Cleavage in *Amphioxus*, frog, chick and man. Fate maps: Fate maps of frog, chick and man. Gastrulation: Morphogenetic movements; Gastrulation in frog and chick and man. Organogenesis: Development of brain and heart in frog.

UNIT – III

Embryonic adaptations; Embryonic membranes and their functions in chick – placentation inmammals. Puberty – Menstrual cycle.

Family welfare - contraception (Tubectomy and Vasectomy).

Reproductive technology: Artificial insemination-cryopreservation-IVF-Embryo transfer – Test tube babies – amniocentosis -Bioethics.

UNIT- IV

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

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,Immunotechniques-Radioimmunoassay (RIA).

Reference Books:

Balinsky, B.L., 1981. Introduction to embryology. Saunders, Philadelphia.

Berril& Corp. Developmental Biology. McGraw Hill Book Company, MC.,New York.

Jayaraj M S.An Introduction to embryology.Veer BalaRastogi Publication.

Verma, P.S., V.K. Agarwal and Tyagi, 1995. Chordate embryology. S. Chand & co., New Delhi.

Majumdar, N.N. 1990. Text Book of Vertebrate embryology. Tata McGraw – Hill PublishingCompany Ltd. New Delhi.

McEwen, R.S., 1969.Vertebrate Embryology. Oxford and IBH Publishing Co., New Delhi.

Jain, P.C 1998, Elements of Developmental Biology. Vishal Publication, New Delhi.

Dubey 2006 Text book of Biotechnology. S. Chand and Co., New Delhi.

Roitt.I.M 2000 Essential Immunology, Blackwell Scientific Publishers.

Paul, W.E.M. 1989, Fundamental Immunology, Raven Press, New York.

Kuby. J.1999, Immunology. W. H. Free man and Co., New York.

Current Protocols in Immunology – 3 Volumes 1994. Wiley Publications.

Roitt. I, Brostoff, J. and Male. D. 2002. Immunology, Mosby, New York.

Richard, A. Golds, Thomas I, Kindt& Barbara A. Osborne 2000. Immunology, Freeman and Co., New York.

MadhaveeLatha. P, 2012. Text book of Immunology, S. Chand & Company.

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Syllabus for B.Sc. Zoology effective from the Batch 2015-2016

Year: III Year Subject Code : U15MZL503 Semester : V

Major - 7 Title: **Animal Physiology**

Credits: 5 Max. Marks. 75

Objective:

To study the basic principles of animal physiology, chemical and physical properties of living matter.

To understand the physiology of various organs and organ systems.

UNIT – I

Basic composition of nutrients: carbohydrates – proteins – lipids – vitamins – minerals – balanced diet. Structure and functions of gastrointestinal system. Role of enzymes in food digestion – absorption – malnutrition.

UNIT – II

Structure and function of human lungs - transport of respiratory gases - respiratory quotient – oxygen debt – anaerobiosis. Structure and functions of human circulatory system – human heart – blood vessels – blood constituents – blood groups, A, B, AB, O, Rh – blood pressure, origin and conduction of heart beat – cardiac cycle – electrocardiogram (ECG).

UNIT – III

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

UNIT – IV

Nervous tissue – components of CNS- Structure and function of Neuron –types of neurons. Nerve impulse – Synapse – Synaptictransmission of impulses – Neurotransmitters. Receptors – Photo and phonoreceptors– Physiology of vision and mechanism of hearing.

UNIT- V

Sexual reproduction: in mammals (man). Male sex hormones - female sex hormones. Menstrual cycle, menopause, pregnancy & parturition. Endocrinology: Structure, function and hormones of pituitary, thyroid, parathyroid, adrenal, islets of Langerhans.

Reference Books:

Sambasivaiah, Kamalakararao and Augustine chellappa 1990. A Text book of Animal Physiology and Ecology, S. Chand & co., Ltd., New Delhi – 110 055.

Parameswaran, Anantakrishnan and Ananta Subramanyam, 1975. Outlines of Animal Physiology,S. Viswanathan [printers& Publishers] Pvt., Ltd.

William S. Hoar, 1976. General and Comparative Physiology, Prentice Hall of India Pvt., Ltd., NewDelhi. 110 001.

Wood.D.W, 1983, Principles of Animal Physiology 3rd Ed.

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 2015-2016

Year: III Year Subject Code : U15EZL501 Semester : V

Elective - 1 Title: **Bioinstrumentation (Elective - I)**

Credits: 3 Max. Marks. 75

Objective:

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

UNIT – I

Microscopy: Light microscopy – Phase contrast – Fluorescence& Integrated – Polarized – Scanning and Transmission electron microscopy. Camera Lucida –structure and function.

UNIT – II

Centrifugation: principle-sedimentation coefficient-types of centrifuges. Principle and types of pH measurements. Cryotechniques – cryopreservation.

UNIT – III

Chromatography: paper – thin layer – column – gas – liquid chromatography – High Performance Liquid Chromatography (HPLC). Spectrophotometry-Principle andApplications of Colorimetry and UV Spectrophotometer.

UNIT – IV

Media - preparation and sterilization. Autoclave-Principle and Application. Staining: simple and Gram staining – microbial assays – cell and tissue culture techniques.

UNIT – V

Electrophoresis: Poly Acrylamide Gel Electrophoresis (PAGE) – immunoelectrophoresis. Polymerase Chain Reaction (PCR), Enzyme Linked Immuno Sorbent Assay (ELISA), Southern, Northern, Western blotting techniques – sequencing of nucleic acids and proteins.

Reference Books:

1. N. Gurumani: Research methodology for biological sciences. M. J. P. Publishers.
2. S. V. S. Rana: Biotechniques. Rastogi Publications, Shivaji Road, Meerut – 250002.
3. P. Palanivelu: Analytical Biochemistry and Separation Techniques. Tulsi Book Centre. Gung complex. 1st Floor, 71, Town Hall Road, Madurai – 625 001.
4. Keith Wilson and John Walker, Practical Biochemistry. Cambridge Publishers.

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Syllabus for B.Sc. Zoology effective from the Batch 2015-2016

Year:	III Year	Subject Code :	U15SZL501	Semester :	V
Skill Based - 3	Title:	**Pisciculture (SBS - III)**			
Credits:	3			Max. Marks. 60	

Objective:

To introduce basic knowledge of fish culturing methods and techniques.

Unit I

Definition, Scope of Pisciculture, Pisciculture in India – Freshwater, Coastal and marine pisciculture – candidate species and their qualities.

Unit II

Types of fish ponds – Preparation of pond for fish culture - nursery pond, rearing pond and culture pond. Water quality management.Economics of a pond and social issues.

Unit III: CULTIVATION OF SPECIES

Types of culture: extensive - semi-intensive and intensive culture – monoculture - monosex culture – polyculture - cage culture - pen culture - integrated fish farming. Breeding of Carps- Natural and Induced breeding. Ornamental Fishes-Aquarium setting and its importance.

Unit IV: FEED FORMULATION

Fish feed: artificial feed – feed formulation – need - ingredients ratio – pellets-FCR. Live feeds and their culture: *Artemia* – rotifers - microalgae.

Unit V: DISEASE MANAGEMENT

Diseases in pisciculture: viral, bacterial, fungal and parasitic pathogens of fish. Disease diagnostics-Preventive and control measures.

Reference Books:

1. Jhingran V.G. 1985, Fish & Fisheries of India, Hindustan Publishing Co. New Delhi. 666p.Trivedi K.K [Ed] 1986 Fisheries Devt. 2000 AD. Association of India fisheries industries, Oxford &IBH, New Delhi 268pp.
2. Santhanam, R., N. Sukumaran and P. Natarajan., A manual of freshwater aquaculture. Oxford & IBH Publishing Co. Pvt. Ltd., 66 Janpath, New Delhi – 110 001.
3. Sundararaj, V. and B. Srikrishnadhas, Cultivable aquatic organisms, Narendra Publishing House, 1417, Krishnan Dutt Street, Maliwara, Delhi – 110 006.
4. Pillai, T.V.R., Aquaculture and the environment. 1st edition, Fishing news Books, England, 1992.
5. Pandian, T.J., Sustainable Indian Fisheries, 2001
6. S. Paulraj., Shrimp farming techniques, problems and solutions-1995
7. Kurian, C.V and V.O. Sebastian. Prawns and prawn fisheries of India IV edition 1993

Victor, A.C., A. Chellam, S. Dharmaraj and T.S. Velayudhan, Manual on pearl oyster seed production, farming and pearl culture, CMFRI Special publication-1995.

C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for B.Sc. Zoology effective from the Batch 2015-2016

Year: III Year Subject Code : U15MZL601 Semester : Vi

Major - 8 Title: **Environmental Biology**

Credits: 5 Max. Marks. 75

Objective:

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

To study the impact of eco factors on the morphology and distribution of organisms.

UNIT – I

Scope – concept – Branches in ecology – Autecology, synecology -Micro and macro environment – types of media and substratum and their influences on animals – Water: Properties, Forms ofwater, Soft and hard water. Air composition – properties. Substratum: Soil: Types, soil profile,soil formation and soil groups of India.

UNIT – II

Biosphere – Hydrosphere – Lithosphere – Atmosphere. Temperature: Distribution oftemperature, thermal stratification – Temperature as a limiting factor, thermal adaptations. Lightas a limiting factor. Pressure, gravity, Moisture and humidity. Liebig's law of minimum, Shelford's lawof tolerance.

UNIT – III

Structure and function of ecosystem-food chain-food web-energy flow and energy pyramids. Biogeochemical cycles – gaseous cycle [N2] -sedimentary cycle[phosphates]. Intra-specific andinter-specific animal associations: colony formation, social organization, predation, parasitism,commensalism, mutualism, interspecific competition – Competitive principle or Gause'sprinciple.

UNIT – IV

Population: Definition – characteristics – Natality, Mortality, age distribution, Population growthforms, population fluctuation. Community, Ecotone and edge effects – ecological succession.Conservation - Wild life management, Preservation – laws enforced – sanctuaries, National parks.Natural resources management: renewable and non-renewable.

UNIT – V

Environmental degradation and Pollution – deforestation, urbanization, population explosion and otherenvironmental hazards –Types of pollution: air, water, soil, noise and radioactive-depleting natural resources and relationship between poverty andenvironmental degradation and vice versa. Environmental ethics and laws – Earth summits – roleof governmental agencies for environmental monitoring.

Reference Books:

Kotpal. R.L, and N.P. Bali, 1986. Concepts of Ecology, Vishal Publications, New Delhi – 7.

Rastogi V.B, and M.S. Jayaraj, 1988 – 1989. Animal Ecology and Distribution of animals, Kedarnath, Ram Nath Meerut – 250 001.

Clark, G.L. 1954, Elements of Eology, John wiley& Sons Inc., New York, London.

Ananthakrishnan, T.N, and S. Viswanathan, Principles of Animal Ecology.

Eugene P. Odum, 1971. Fundamentals of ecology, Saunders International Student Edition, W.B.Saunders Company, Philadelphia London, Toronto.

Verma, P.S and Agarwal 1986, Environmental Biology, S. Chand & Co Ltd.Richard, Manual of wild life conservation

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Syllabus for B.Sc. Zoology effective from the Batch 2015-2016

Year: III Year Subject Code : U15MZL602 Semester : VI

Major - 9 Title: **Economic Zoology**

Credits: 4 Max. Marks. 75

Objectives:

To encourage young learners to take up the small scale industries.

To generate motivation for self-employment.

To disseminate information on economic aspects of zoology.

To inculcate knowledge on useful animals to Mankind.

To satisfy the learners with modern techniques of animal culture.

UNIT – I

Vermiculture: Methods of composting

Economic Entomology:Apiculture - Species of Honeybees –Honey extraction – Economics of Apiculture and management.

Sericulture – Nature and economic importance of sericulture in India. Lac culture.

UNIT –II

Economics of aquatic animals-fishes (larvivorous),ornamental. Prawn [*Macrobrachiumrosenbergii*&*Penaeusmonodon*).

Pearl culture: Formation and nature of Pearls – Commercial importance of Pearl Culture in India.

Techniques of induced breeding in fishes, crabs and lobsters, commercial culture of catla&Indian catfish, by–products of fishes and their commercial values.

UNIT – III

Economics of Poultry keeping. Morphology of different breeds of Chicken – Brooding and Rearingof Chicks – Processing of Egg, Meat and by–Products of Poultry.

UNIT – IV

A]: Dairy farm management, Milch breeds. Draft Breeds, Dual Purpose breeds and New crossBreeds of Cows and Buffaloes in India.

B]: Sheep farming: Indigenous and Exotic breeds of sheep

UNIT – V

Future strategies for Livestock Development –Genetic.

Improvement for best Breeds – Economic importance of Dairy, Leather, Wool, Fur. Medicinal products from animals.

Reference Books:

Sukla, G.S. and Upadhyay, V.B., 2000, Economic Zoology – ISBN – 81- 7133 -137 -8

Rastogi Publication, Meerut, India.

Jawaid Ahsan and Subhas Prasad sinha – 2000, A Handbook on Economic Zoolgy - ISBN – 81 – 219-0876 – 0, S. Chand & co., Ltd., New Delhi.

Ashok Kumar and Prem Mohan Nigam, 1991, Economic and Applied Entomology, Emkay Publication, New Delhi.

Shammi,Q.J. and Bhatnagar, S., 2002, Applied Fisheries: ISBN – 81 – 7754 – 114 – 5, Agrobios [India], jodhpur – India.

Major Hall, C.B. 2005, Ponds and Fish culture – ISBN – 81 – 7754- 146 – 3, Agrobios [India], Jodhpur - India

Keith Wilson, N.D.P., 2005, A Handbook of Poultry Practice – ISBN – 81 – 7754 -0- 69- 6

Agrobios [India], Jodhpur– India.

Banerjee, G. C. 1992, Poultry – III – Edition – ISBN – 81 – 204 – 008 – 4, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

Banerjee, 1988, A text book of Animal Husbandry – VIII- Edition – ISBN – 81- 204 – 1260 -5, Oxford & IBH Publishing co. Pvt. Ltd., New Delhi.

Kaushish, S.K., 2001, Trends in livestock Research – ISBN – 81 – 7754 – 112 – 9, Agrobios [India], Jodhpur– India.

Ismail, S.A1997. Vermicology the Biology of Earthworm. Orient Longman, India.

Mary Violet chrishty 2008 Vermitechonology MJP Publ. Chennai.

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Syllabus for B.Sc. Zoology effective from the Batch 2015-2016

Year: III Year Subject Code : U15MZL603 Semester : VI

Major - 10 Title: **Evolution**

Credits: 4 Max. Marks. 75

Objectives:

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

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, NeoLamarckism, Darwinism, NeoDarwinism, DeVries concept of Mutation,Modern concept of Mutation theory.

UNIT – III

Natural selection:Types, stabilizing and diversifying directional selection, Variation: Types ofvariation.

UNIT-IV

Mimicry and colouration – Batesian and Mullerian mimicry and evolution, living fossils. Geographical distribution of animals.

UNIT – V

Isolation – Premating and post mating isolating mechanism, speciation, Evolution of man –Biological and cultural.

Reference Books:

Agarwal, V.K and Usha Gupta – Evolution and animal distribution, Chand and Co.

Dodson,E.O. 1990. Evolution, Reinhold, Newyork.

Francisco, J.Ayla – Evolution, Surject publication.

Gopalakrishnan,T.S. IttaSambasivaiah and A.P.Kamalakara Rao. Principles of organic Evolution,Himalaya publishing house.

T.K.Ranganathan, Evolution. 1994 Rainbow Printers, Palayankottai.

Veer BalaRastogi. Organic Evolution, Meerut Publications.

Arumugam, N. Organic Evolution, 2009. Saras Publishers,.Nagarcoil, Kanyakumari Dt.

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Year: III Year Subject Code : U15EZL601 Semester : VI

Elective - 2 Title: **Biochemistry (Elective - II)**

Credits: 3 Max. Marks. 75

Objective:

To define and explain the basic principles of biochemistry.

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 theirconcept.

UNIT – II

Enzymes and co-enzymes – classification and nomenclature -functions, substrate specificity, factors influencing the enzyme action – Structure of haemoglobin and its function.

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 – Structure and function of purines and pyrimidines.

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.

Reference Books:

1. Shanumugam, A., 1977. Fundamentals of biochemistry for medical students. Navabharat Printers and Traders, Madras-86.
2. Stryer, L., W. H., 1995. Biochemistry. Freeman and Company, San Francisco.
3. Lehninger, A. L., 1993. Principles of biochemistry. CBS Publishers and Distributors, New Delhi-32.

4. 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.
5. 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.
6. Kuchel P.W & G. B. Ralston, 2003. Schaum's outlines of biochemistry (2nd edition). Tata McGraw-Hill Edition.

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 2015-2016

Year: III Year Subject Code : U15EZL602 Semester : VI

Elective - 3 Title: **Nanotechnology In Life Science (Elective - III)**

Credits: 3 Max. Marks. 75

Objectives:

To impart current knowledge in Nanotechnology

To create fundamental understanding of usage of Nanometerial in life sciences.

UNIT I:

Definition-History and scope of nanotechnology - Nanoparticles and their properties - Types of nanoparticles- lipids, polymers, proteins and DNA.

UNIT II:

Top down & Bottom up process – Ball Milling, co-precipitation, sol-gel and electrodeposition

Application of Electron Microscopy-TEM & SEM, - X-Ray diffraction-FTIR-AFM.

UNIT III:

Definition - New Forms of Carbon – Types of Nanotubes – Formation of Nanotubes – Uses for nanotubes – Biological Applications.

UNIT IV:

Nano biosensors - microfluidic devices - Tissue engineering with biocompatible nanostructures, soft lithography

UNIT V:

Application of nanotechnology in Agriculture and environment.

Nanomedicine – Magic Bullet – Quantum dots – Cancer therapy – Nanodrugs and their loading and delivery – Nucleic acids (DNA & RNA), Liposome-mediated drug delivery – Medical implants.

Reference Books:

Shanmugam, S.2009: Nanotechnology, MJP-Publ. Chennai – India.

Kumar,U, W008 : Nanotechnology – A Fundamental Approach – Agrobios – India

Ratner, 2008: Nanotechnology-A Gentle Introduction to next big idea Tamilnadu Book House,Chennai – India.

Goodshell, D.S, 2004 – Biotechnology: Lessons from Nature – John Wiley & Sons (Asla) Publ.Ltd,Singapore.

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Syllabus for B.Sc. Zoology effective from the Batch 2015-2016

Year:	III Year	Subject Code :	U15SZL601	Semester :	VI
Skill Based - 4	Title:	**Medical Laboratory Techniques (SBS - IV)**			
Credits:	3			Max. Marks. 60	

Objectives:

To impart awareness on Clinical Lab Technology.
To create knowledge on Self-Employment Opportunity.

UNIT – I:

Scope of Medical Lab Technology – Medical laboratory personnel – code of conduct - laboratory management and safety measures - safe disposal of hospital waste - laboratory requirements. Sterilization: dry heat - hot air oven, moist heat - autoclave, pressure cooker, ultraviolet radiation, chemical sterilization. Laboratory equipments: spectrophotometer, inoculator, refrigerator, autoanalyser, microcentrifuge, automatic pipettes.

UNIT – II:

Collection of blood samples, composition of blood. Blood groups - ABO group and Rh factor, Packed Cell Volume (PCV), Erythrocyte Sedimentation Rate (ESR). RBC count, WBC count, Reticulocyte count, total count, differential count, Heamoglobin estimation, blood sugar estimation. Basic principles of blood transfusions.

UNIT – III:

Clinical diagnosis of diseases and detection techniques: Typhoid,Cholera, Tuberculosis, Polio, Measles, Amoebiasis and Filariasis.

UNIT – IV:

Urine: Physical examination, blood cells, urinary glucose, urinary albumin, bile salts, ketone bodies, Urine culture – Antibiotic susceptibility test, Pregnancy test (detection of hCG) – Faeces (stool): Components of faeces, their characteristics, factors affecting faecal composition. Parasites of intestine – identification of infection – *Ascaris*, Pinworm, *Entamoeba*, *Giardia*, Occult blood in stool. Sputum: Analysis of sputum – Pathological conditions that can be detected in sputum – their causes.

UNIT – V:

Cerebrospinal fluid: formation, composition, function, conditions altering its composition – their causes – Semen: Sperm count, abnormal sperms, common pathological conditions detected in semen – their causes. Amniotic fluid: sex determination, amniocentesis.

Reference Books:

Samuel, K.M. 1992: Notes on Clinical Lab Techniques. M.K.G. Iyyer& Sons Publ. Co., Chennai – India.

Dubey, R.C., and Maheswari, D.K.2007; A text book of Microbiology, S. Chand and Co. Publ. NewDelhi – India.

Purohit, S.S. 2005: Microbiology – Fundamentals and Applications [6th Edition], Student Edition – Jodhpur – India.

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

Ochei, 2000: Medical Laboratory Science – Theory and Practice – Tata McGraw Hill Publ, Co., - Noida – India.